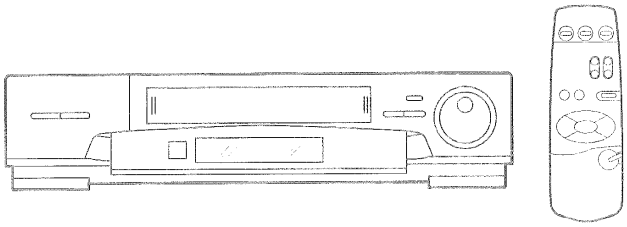
TOSHIBA

FILE NO. 110-9501

SERVICE MANUAL

VIDEO CASSETTE RECORDER

V-X990



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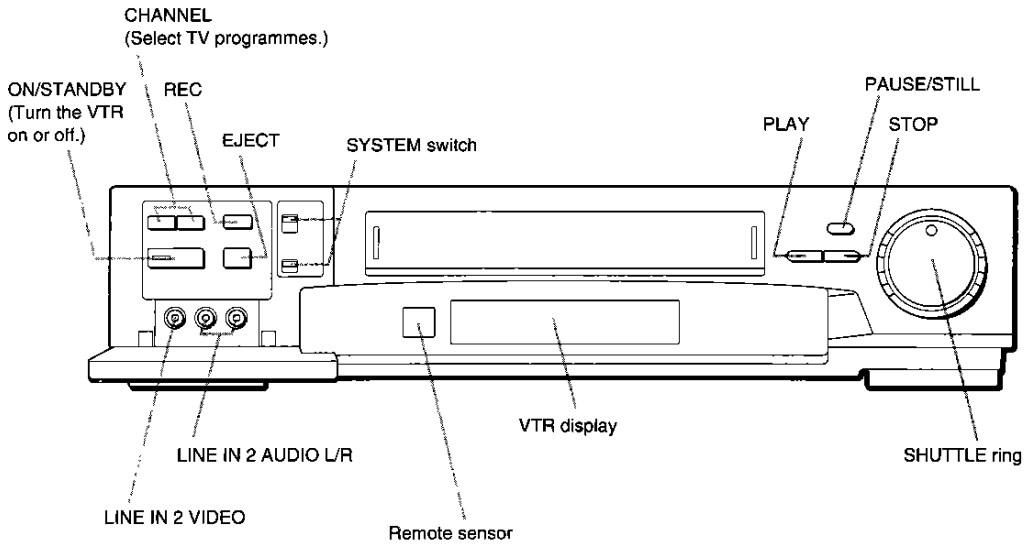
SECTION 1
GENERAL DESCRIPTIONS

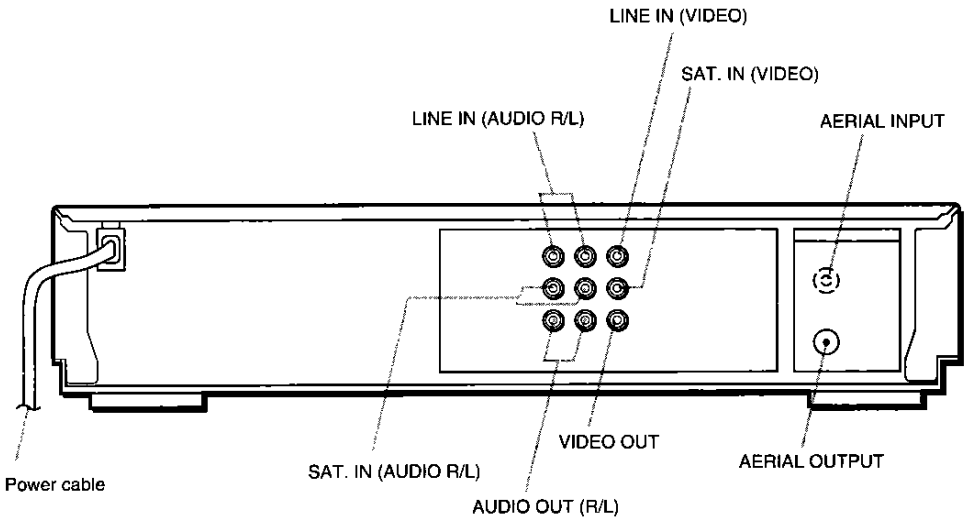
OPERATING INSTRUCTIONS

1 IDENTIFICATION OF CONTROLS

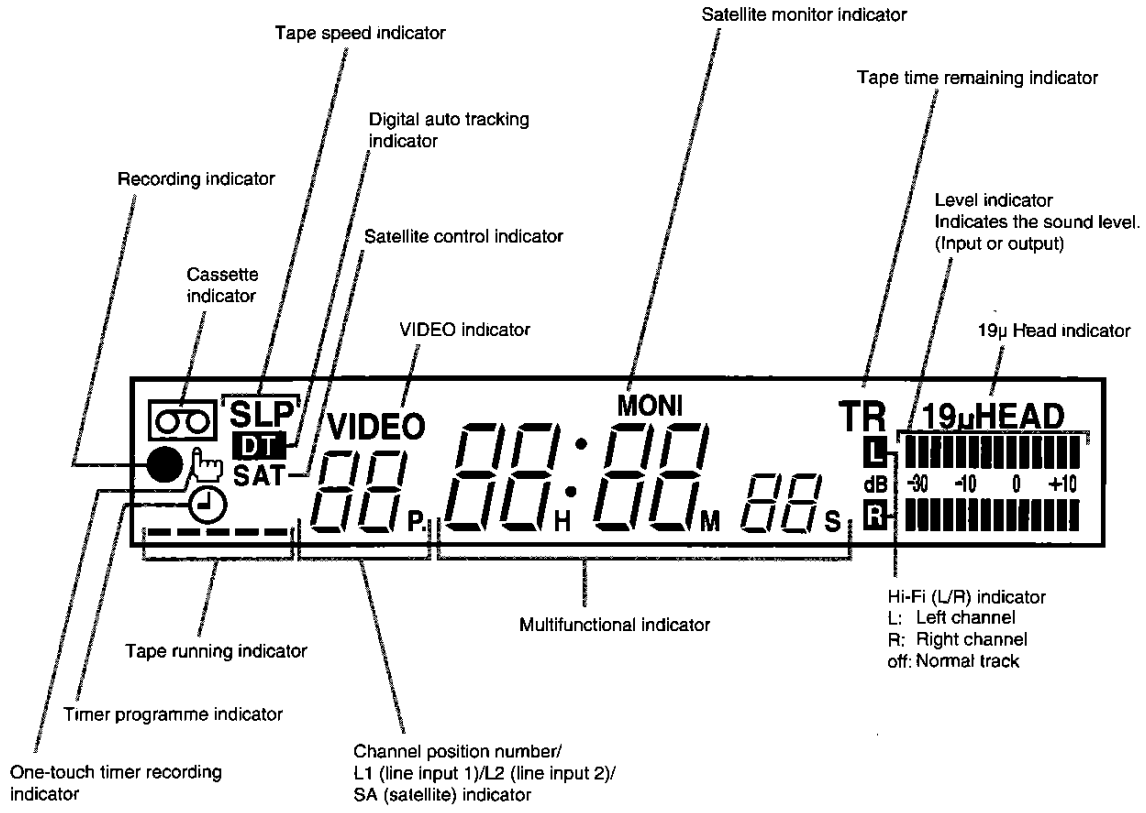
Front Panel



Rear Panel

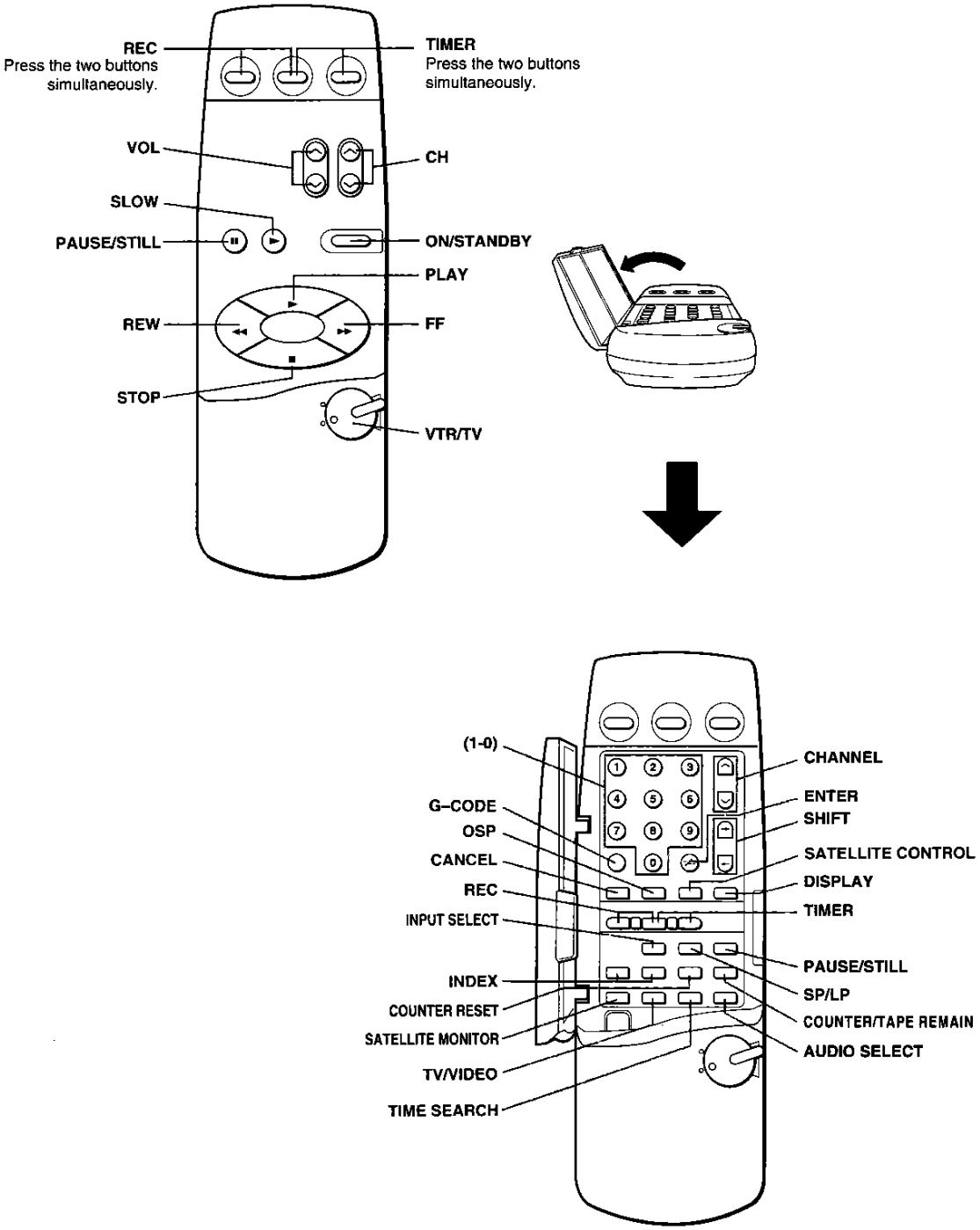


VTR Display


Satellite monitor indicator
Tape speed indicator
Tape time remaining indicator
Digital auto tracking indicator
Recording indicator
Level indicator
Indicates the sound level.
(Input or output)
Satellite control indicator
Cassette indicator
VIDEO indicator
19µ Head indicator
SLP
DT
SAT
VIDEO
MONI
TR
19µHEAD
dB
-30 -10 0 +10
P
H
M
S
Hi-Fi (L/R) indicator
L: Left channel
R: Right channel
off: Normal track
Multifunctional indicator
Tape running indicator
Timer programme indicator
One-touch timer recording indicator
Channel position number/
L1 (line input 1)/L2 (line input 2)/
SA (satellite) indicator

1 IDENTIFICATION OF CONTROLS

Remote Controller



1 MULTI BRAND REMOTE CONTROLLER

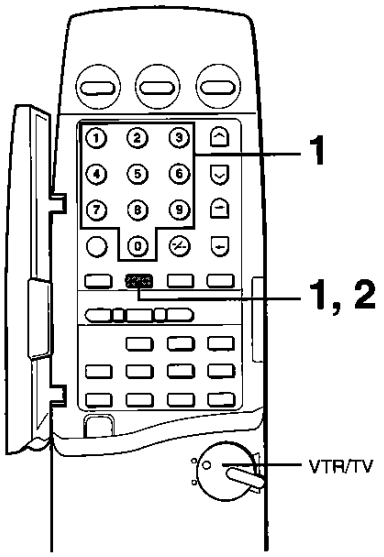
The remote controller provided with this VTR is compatible with various brands of TVs.

Information

Remote control codes for a variety of TV brands have been programmed in this remote controller.
The TOSHIBA code has initially been set in the unit.
If your TV is not a TOSHIBA, you must first select a brand code for your brand maker of TV.

Important

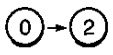
Set the VTR/TV selector on the remote controller to "TV".



Setting the Brand Code

1 While holding down the **OSP** button, press the two digits of your TV's brand code by using **number buttons**.
(For your brand code, see the table on the right.)

Hold down.
OSP



2 Release the **OSP** button.
The brand code you set is memorized in the remote controller.

Release.
OSP

3 Point the remote controller at your TV and use each button listed in "Operating a TV" (see the next page) to make sure that the TV is operated properly.

Note
If you replace the remote controller's batteries, set the brand code again.

Table of Brand Code

Brand name of your TV	Brand code
TOSHIBA	01, 14, 15, 16, 17, 19
AKAI	08
GOLDSTAR	02
GRUNDIG	04, 15, 19
HITACHI	06, 10, 11, 22
JVC	07
MITSUBISHI	02, 09, 14
PANASONIC (NATIONAL)	03, 21, 26
PHILIPS	02, 18, 20
SAMSUNG	02
SANYO	08, 14
SHARP	05, 14
SONY	13, 14
THOMSON	10, 11, 22

- For some brands, several remote control codes (brand code) are allocated.

Operating a TV

Once the brand code is set, you can operate your TV with this remote controller by using the following buttons.

Preparation

Set the VTR/TV selector to "TV".

ON/STANDBY button

To turn the TV on or off.

CH buttons

To select TV channel in the upper or lower direction.

VOL. (Volume) buttons

To adjust the sound level.

INPUT SELECT button

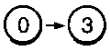
To select an external source, such as a VTR.

Number buttons / ENTER button

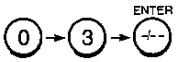
To select TV channel directly.
(Ways of use may differ. Check how they work on your TV.)

Ex. to select TV channel 3.

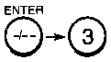
- Press **number button 0 and 3.**



- Press **number button 0, 3** and the **ENTER** button.

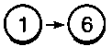


- Press the **ENTER** button and **number button 3.**

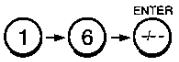


Ex. to select TV channel 16.

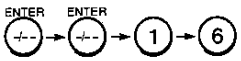
- Press **number button 1 and 6.**



- Press **number button 1, 6** and the **ENTER** button.



- Press the **ENTER** button twice and **number button 1, 6.**

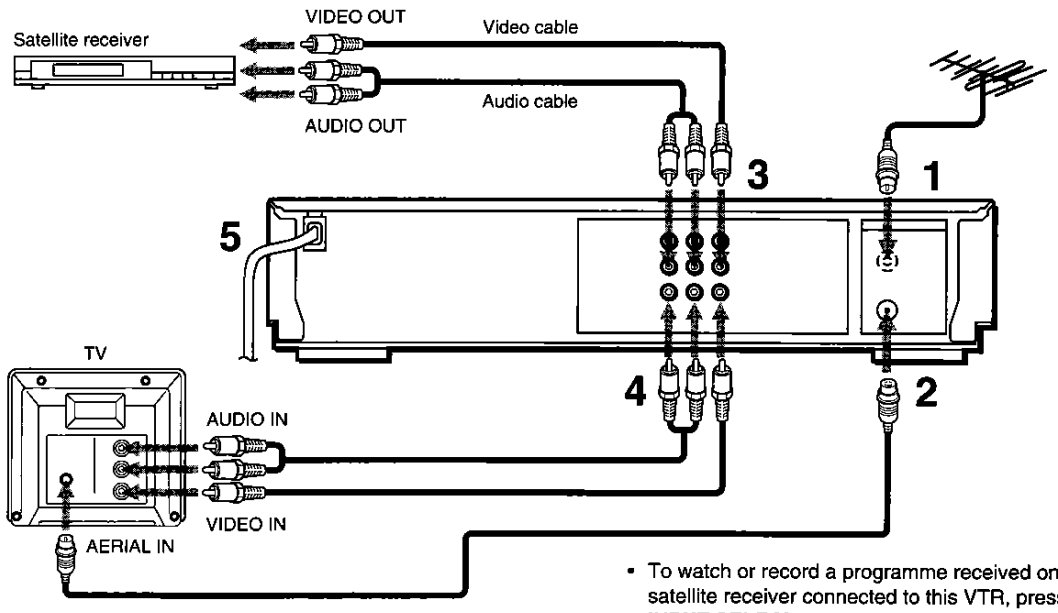


Important

Some TVs may not respond to all of the operations above, or may not be operated at all with this remote controller. In such a case, operate the TV with its own remote controller.

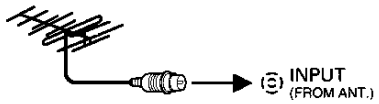
2 CONNECTION TO A SATELLITE RECEIVER

If you have a satellite receiver, you can connect it to this VTR to enjoy watching or recording satellite programmes through the VTR.

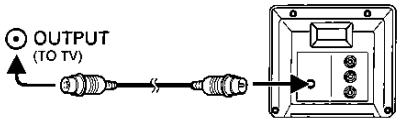


- To watch or record a programme received on the satellite receiver connected to this VTR, press the **INPUT SELECT** button on the remote controller so that "SA" indicator appears in the VTR display.

1 Connect the main antenna aerial to the **AERIAL INPUT** socket on the VTR.



2 Connect the **AERIAL OUTPUT** socket on the VTR to the TV using the supplied aerial cable.



3 Connect the satellite receiver and the VTR via the **SAT. IN (AUDIO, VIDEO)** jacks on the VTR using an audio/video cable (not supplied).

If the connected satellite receiver is monaural (has one audio output jack), connect to the L/MONO side of the AUDIO jacks on the VTR.

4 Connect the **AUDIO OUT** and **VIDEO OUT** jacks on the VTR to the AUDIO IN and VIDEO IN jacks on the TV using an audio/video cable (not supplied).

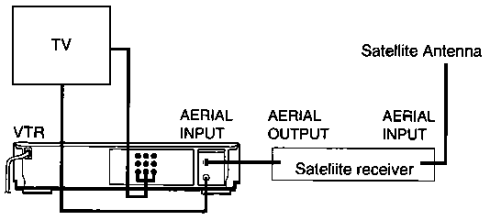
5 Connect the power cable to the mains outlet.

Important

To watch a picture from the VTR using this connection, set the TV to the video input mode using the input select switch on the TV.
For the video input mode setting, refer to the owner's manual of the TV you are using.

■ IF YOUR SATELLITE RECEIVER DOES NOT HAVE A PHONO TYPE JACK

If your satellite receiver does not have a phono type jack, it can be connected using an aerial cable between aerial and VTR. Set a spare channel on the VTR for the satellite output .



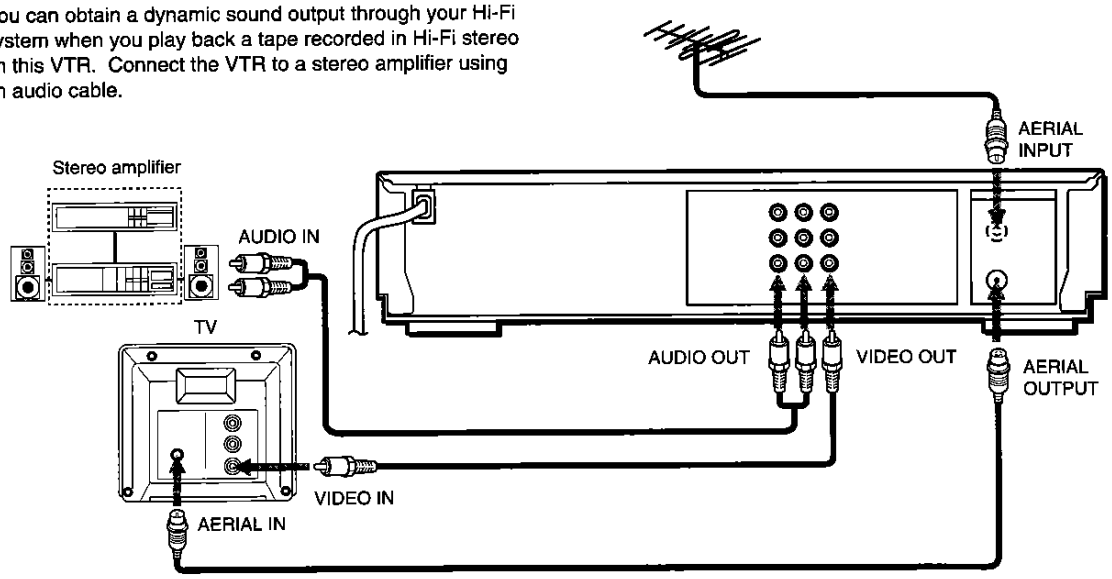
2 ADDITIONAL CONNECTIONS

Other ways of use are possible by connecting other equipment you are using.

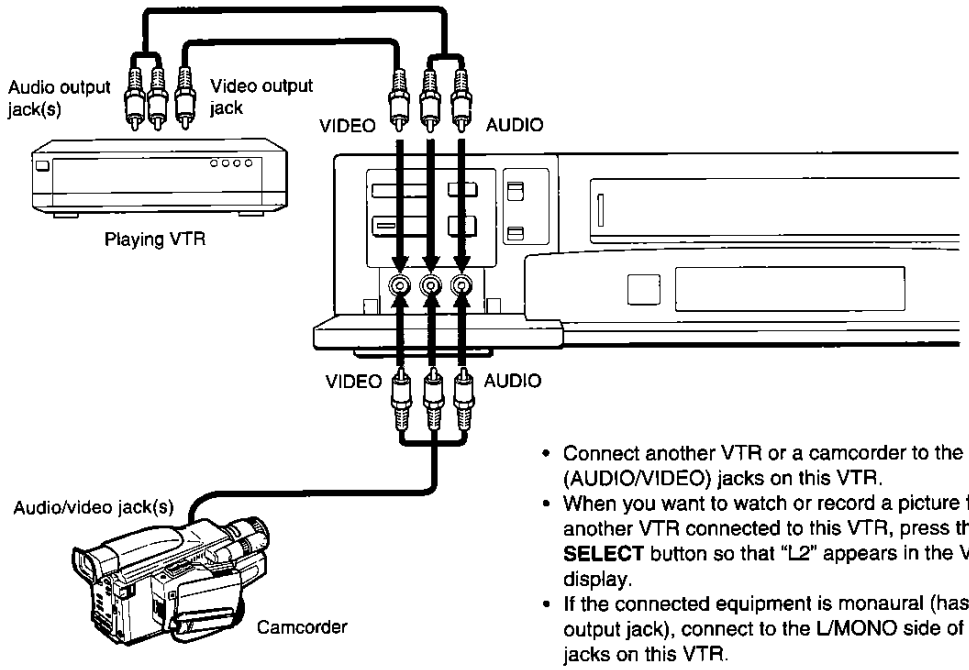
Connection to a Stereo Amplifier

Note The stereo amplifier must have AUDIO IN capability.

You can obtain a dynamic sound output through your Hi-Fi system when you play back a tape recorded in Hi-Fi stereo on this VTR. Connect the VTR to a stereo amplifier using an audio cable.



Connection to Other VTR or External Equipment Using the LINE IN 2 AUDIO/VIDEO Jacks (Phono Type)



- Connect another VTR or a camcorder to the LINE IN 2 (AUDIO/VIDEO) jacks on this VTR.
- When you want to watch or record a picture from another VTR connected to this VTR, press the **INPUT SELECT** button so that "L2" appears in the VTR display.
- If the connected equipment is monaural (has one audio output jack), connect to the L/MONO side of the AUDIO jacks on this VTR.

2 HOW TO ALLOCATE A TV CHANNEL TO THE VIDEO CHANNEL

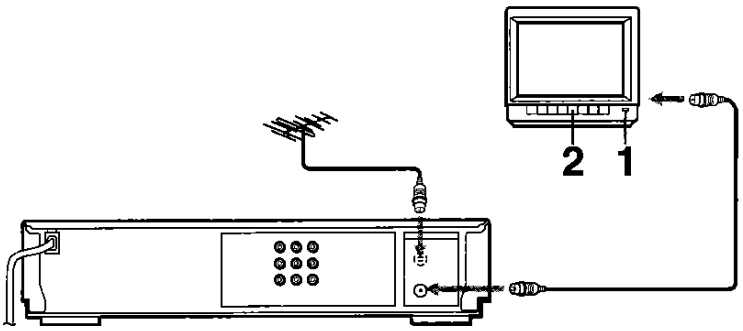
To watch or record video pictures with the aerial connection, set your TV receiving the video signals through the aerial cable from the VTR.

Important

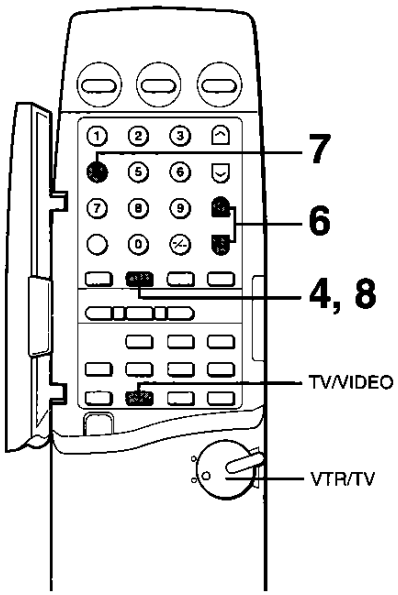
The following adjustment is necessary when the VTR is connected to the TV via the AERIAL OUTPUT socket only.

Information

The VTR converts the received signals into the type of output signals used in TV broadcasts, and send them to your TV from the AERIAL OUTPUT socket. Your television must have a channel set aside exclusively for these VTR signals. This is called the video channel.



Set the VTR/TV selector to "VTR".



1 Turn on the TV.

2 Select a free station on the TV which you wish to use for your video picture, for example station 9.
This station 9 will be only used for watching a video picture.

3 Press the **ON/STANDBY** button to turn on the VTR.

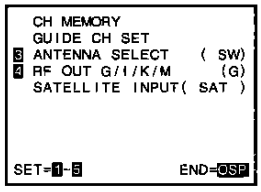
ON/STANDBY

4 Hold down the **OSP** button **for more than 5 seconds.**

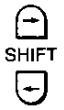
VTR display

5 Tune the TV (on station 9 for example in step 2) to around UHF channel 60 so that the following screen is shown clearly.
(For tuning the TV, refer to the TV's manual.)
In China, tune to around UHF channel 47.

TV screen



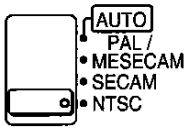
6 If after tuning (in step 5), you still have some interference because of neighbouring broadcast channels, press the **SHIFT** button to select another video channel between channels 53 and 89.



Re-tune the TV to around UHF channel 62 (for example), and confirm the screen is displayed clearly.
In China, tune to around UHF channel 49.

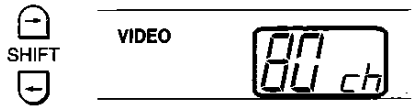
Video channel setting in an NTSC-system area

1) Set the SYSTEM switch to "NTSC" position.



2) If you live in an area where you can receive NTSC-M broadcasts, the U.S. and Japan for example, press the SHIFT button to display the channel numbers from 77 to 89 in the VTR display after performing step 4 on the previous page.

Example: To display channel 80 on the VTR display.

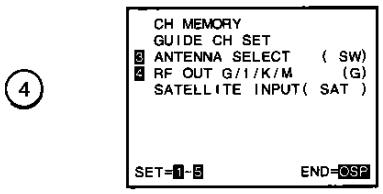


3) Tune the TV so that the same screen as in the step 5 on the previous page appears. Use the table below and tune the TV to around channel 60 in the U.S., around channel 59 in Japan.

4) Perform steps 6 to 8.

	Displayed channels														
Channels indicated in the VTR display	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
Channels used in China	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Channels indicated in the VTR display	77	78	79	80	81	82	83	84	85	86	87	88	89		
Channels used in U.S.	57	58	59	60	61	62	63	64	65	66	67	68	69		
Channels used in Japan	56	57	58	59	60	61	62	–	–	–	–	–	–		

7 Press **number button 4** to select "G", "I", "K" or "M" on the screen according to the TV system of your country.



G: Southeast Asian countries such as Singapore, Thailand or Malaysia, and the Middle and Near East countries, etc.
I: Hong Kong and South Africa, etc.
K: China and Russia, etc.
M: U.S. and Japan, etc.

Note
If this setting is incorrect, a clear picture and sound is not obtained.

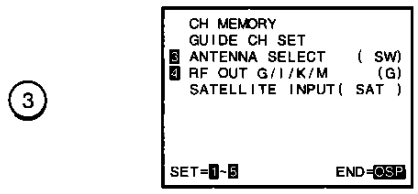
8 Press the **OSP** button.
Video channel setting is complete.

Note
The TV screen here is on the PAL system. If the connected TV is on a SECAM or NTSC system, you will not get a clear screen.

Note on the Antenna Output

On the screen in step 7, the antenna output can be set to "SW" or "MIX".

Press **number button 3** to set "SW" or "MIX".
(applied only when the VTR is connected to your TV only via the AERIAL OUTPUT socket.)



SW: You can watch a video picture on the video channel only when the VIDEO indicator is lit in the VTR display by pressing the TV/VIDEO button.

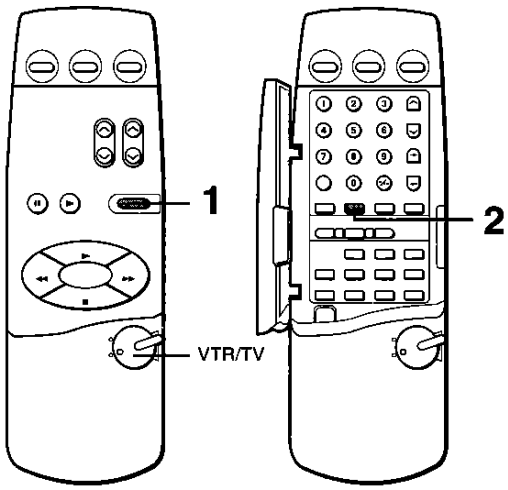
MIX: You can watch a video picture on the video channel regardless of whether or not you have pressed the TV/VIDEO button.
If video pictures or TV pictures cannot be obtained clearly, set to "SW".

2 MENU/SETUP SCREEN

You can set desired functions on the TV screen.

Preparation

- Confirm the TV is on and set it to the video input mode, or select the video channel if you made the aerial connection for the TV and the VTR.
- Set the VTR/TV selector on the remote controller to "VTR".

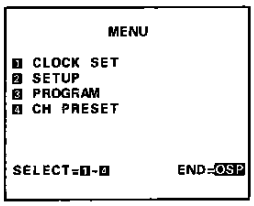


MENU Screen

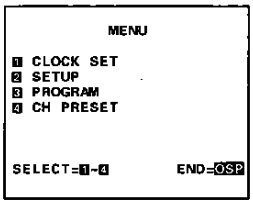
1 Press the **ON/STANDBY** button to turn the VTR on.

ON/STANDBY

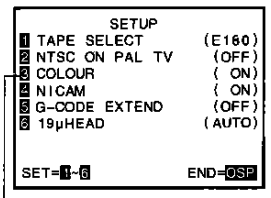
2 Press the **OSP** button.
The MENU screen appears.



SETUP Screen



Press **number button 2**.
The SETUP screen will appear on the TV.



If the TV programme or the tape is monochrome, press **number button 3** to set to "OFF".

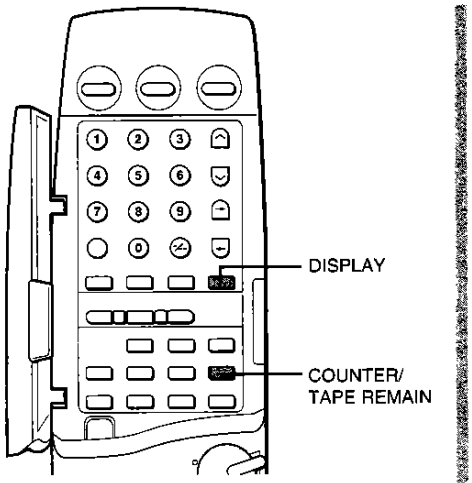
Press the **OSP** button twice to return to the normal TV screen.

2 ON SCREEN DISPLAY

The VTR tells you current operating modes on the TV screen.

Information

- When you press the DISPLAY button, the VTR displays the current operating mode on the TV screen.
- In addition to the indication shown below, the VTR may display other indications such as one for the index search.

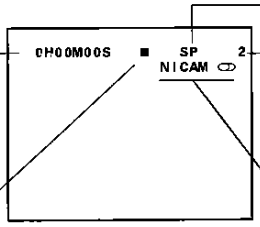


Pressing the **DISPLAY** button can make the indication appear. If you press this button again, the indication goes off, leaving the counter indication (counter, tape remaining, clock) on the screen. To turn it off, press the **DISPLAY** button once more.

Recording tape speed (SP/LP/SLP)

Counter indication
- Linear time counter
- Tape time remaining
- Clock

Each time the **COUNTER/TAPE REMAIN** button is pressed, the indication changes.



Channel position number

The indicator varies with the operating mode.

Ejecting a tape	⏏
Stop	■
Double speed playback Fast-forwarding Forward picture search	▶▶
Rewinding Reverse picture search	◀◀
Recording	●
Recording pause	II●
Playback	▶
Reverse playback	◀
Still picture Frame advance	II
Slow playback	▮▶
Reverse slow playback	◀▮

The indication varies with the receiving STEREO/BILINGUAL broadcast.

NICAM broadcasts	
NICAM Stereo or Mono	NICAM ⊂⊃
NICAM Bilingual sound (transmitted in another language)	NICAM I/II
No NICAM programme received (Standard mono)	not lit

GERMAN STEREO/BILINGUAL broadcasts	
STEREO TV programme	⊂⊃
BILINGUAL TV programme	I/II
Normal TV programme (monaural sound)	not lit

2 HOW TO ALLOCATE TV STATIONS ON THE VTR

To watch and record TV programmes via the VTR, it is first necessary to store each TV station in the memory of the VTR. This VTR can store up to 48 positions for TV broadcasting stations.

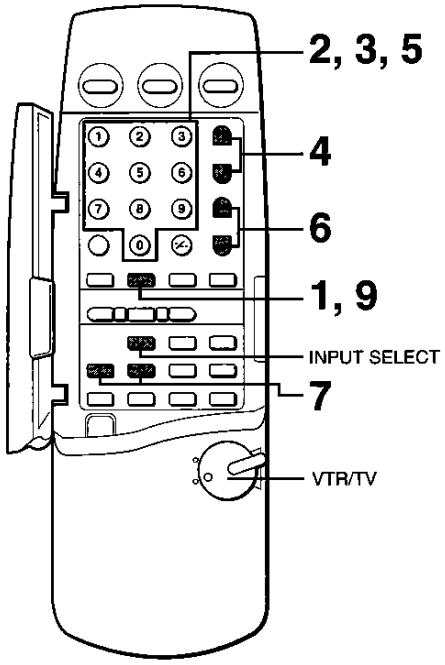
Information

To receive broadcast programmes on this VTR, it is necessary to set the tuning range number correctly according to the television system used in your area. The TV channel numbers in the parentheses are indicated in the VTR display.

Preparation

- Select the video channel or video input mode on the TV.
- Set the VTR/TV selector to "VTR".
- Turn on the VTR.

Television system		Tuning range number	Band	TV channel number
PAL B/G (Singapore, Malaysia, Thailand, etc.) SECAM B/G (Middle and Near East countries)		1	VHF UHF CATV	E2 – E12 (2 – 12) E21 – E69 (21 – 69) X, Y, Z (71, 72, 73)
		2	CATV	S1 – S41(1 – 41)
PAL I (Hong Kong, South Africa, etc.)		3	VHF UHF	SA4 – SA13 (74 – 83) E21 – E69 (21 – 69)
SECAM D/K (Russia etc.)		4	VHF UHF	R1 – R12 (1 – 12) E21 – E69 (21 – 69)
PAL D (China etc.)		5	VHF UHF	C1 – C12 (1 – 12) C13 – C57 (13 – 57)
NTSC-M (U.S., Japan, etc.)	U.S.	6	VHF UHF	2 – 13 (2 – 13) 14 – 69 (14 – 69)
		7	CATV (1~125)	1 – 99 (1 – 99)
		8		100 – 125 (0 – 25)
		9	CATV (HRC) (1~125)	1 – 99 (1 – 99)
		A		100 – 125 (0 – 25)
		B	CATV (IRC) (1~125)	1 – 99 (1 – 99)
		C		100 – 125 (0 – 25)
	Japan	D	VHF UHF	1 – 12 (1 – 12) 13 – 62 (13 – 62)
		E	CATV	C13 – C63 (13 – 63)



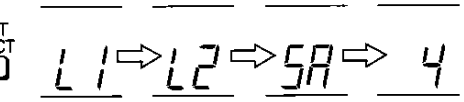
Notes

- HRC: Harmonic Related Carries cable TV signals.
- IRC: Incremental Related Carries cable TV signals.
  IRC is also called ICC (Incremental Coherent Carries).

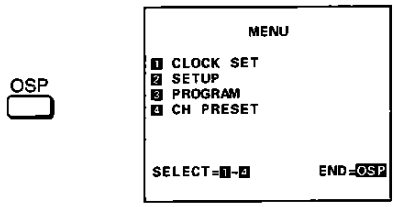
Example **to store UHF 26 channel of the SECAM B/G (broadcast in Middle and Near East countries) to position number 1.**

Important

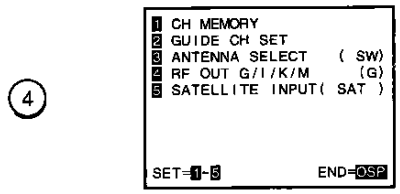
If the "L1", "L2" or "SA" indicator appears in the VTR display, press the INPUT SELECT button so that the position number appears.



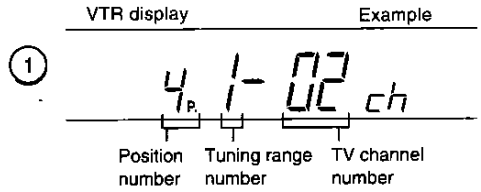
1 Press the **OSP** button.



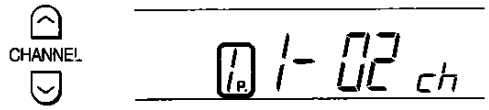
2 Press **number button 4**.



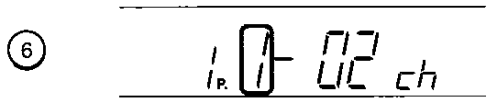
3 Press **number button 1**.
The VTR enters the tuning mode.



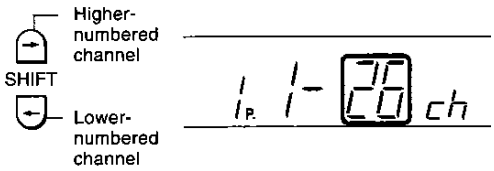
4 Press the **CHANNEL** button to select position number 1 for this example.



5 Press **number button 6** to select a tuning range number. (See the table on the previous page.)
Each time you press the button, the number changes cyclically. Select tuning range number 1 (SECAM B/G) for this example.

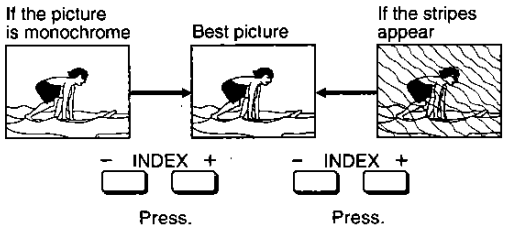


6 Press the **SHIFT** button to search for a TV station you want to store.
Search for TV channel number 26 for this example.



- If the received TV station signal is tuned in, searching stops automatically. Press the **SHIFT** button to restart channel search operation.

7 If a clear picture does not appear on the TV screen after searching is finished, make fine adjustment with the **INDEX** buttons.



8 Repeat steps 4 to 7 for other TV stations.
For this example, since position number 1 is already used, store other TV channels using position numbers 2, 3 . . . 48 in step 4.

Record all position numbers you stored on the VTR in the chart shown in the item "Preparation for G-Code Recording" so that you will be ready to use the G-Code recording.

9 Press the **OSP** button.
Channel tuning is now complete.

Once channel tuning is done, you will select the TV station by selecting the position number on which the desired TV station is stored.

2 HOW TO ALLOCATE TV STATIONS ON THE VTR

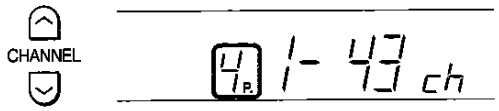
Skipping Channels

You can prevent the use of certain channel position numbers when you use the skip function.

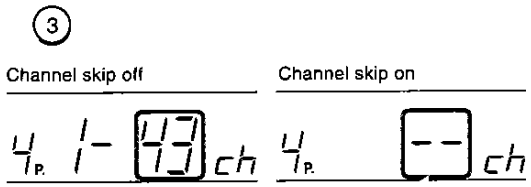
1) Set the VTR to the tuning mode following steps 1 to 3 of the channel storing procedure on the previous page.

2) Select the position number you want to skip with the **CHANNEL** button.

Example **to skip position number 4**



3) Press **number button 3.**
The following indication will appear in the VTR display with the skip function on or off.



If you press **number button 3** again, the TV channel number will appear and the skip function will be cancelled.

4) Press the **OSP** button.
Channel skipping is now complete.

To cancel channel skipping
Follow steps **1)** to **4)** above.

Preparation for G-Code Recording

To make the initial setting for G-Code recording, prepare the list below.
For all TV stations you have stored on the VTR, fill in the blanks with the position number you used, and the corresponding GUIDE channel.
The GUIDE channel has already been allocated to each TV station. You can get the numbers from charts carried in some TV magazines.

TV stations	GUIDE channel	Position number in which the TV station has been memorized on the VTR (in step 4)
HONG KONG & MACAU		
TVB Jade	001	
ATV Home	002	
TVB Pearl	003	
ATV World	004	
TDM Chinese Ch	041	
TDM Portuguese Ch	042	
HONG KONG & MACAU (Satellite)		
Prime Sports	005	
MTV	006	
Chinese	007	
BBC	008	
Star Plus	009	

TV stations	GUIDE channel	Position number in which the TV station has been memorized on the VTR (in step 4)
SINGAPORE		
RTM 1	001	
RTM 2	002	
SBC 5	005	
SBC 8	008	
SBC 12	012	
MALAYSIA		
TV 1	001	
TV 2	002	
TV 3	003	
SBC 5	005	
SBC 8	008	
SBC 12	012	

Enter the number allocated to each TV station looking up TV magazines.

2 SETTING THE CLOCK

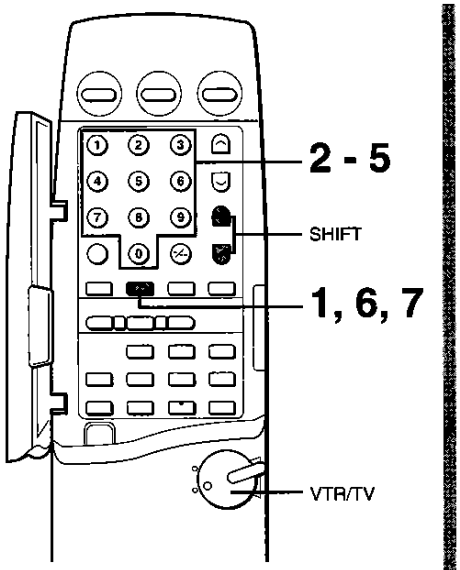
When the VTR is first connected to the AC socket or after a power failure, "0:00" blinks in the VTR display and it is necessary to set the clock.

Preparation

- Turn on the VTR.
- Select the video channel or video input mode on the TV.
- Set the VTR/TV selector to "VTR".

Information

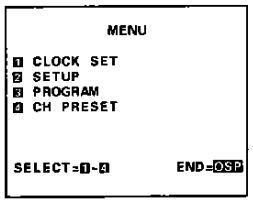
The item to be set will blink. Set the data with the number buttons, following the blinking position. You can change the blinking position by pressing the SHIFT (→/←) buttons.



Example **to set the clock to 15:30 on October 5, 1994.**

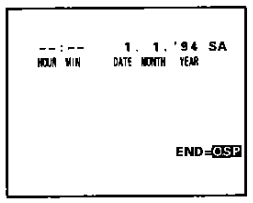
1 Press the **OSP** button.

OSP



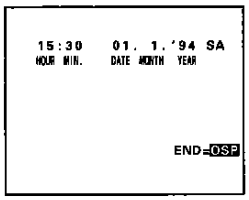
2 Press **number button 1**.

(1)



3 Set the hours and minutes. (24 hours clock format)

(1)→(5)→(3)→(0)

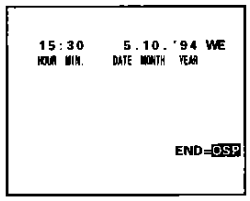


Correcting a mistake

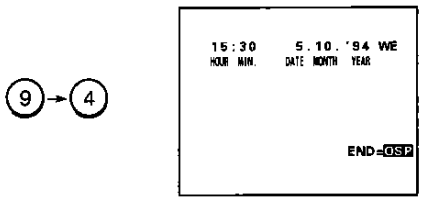
Press the SHIFT (←) button repeatedly until the number you set incorrectly blinks. Press the correct number button and then press the SHIFT (→) button to return to the previous digit.

4 Set the day and month.

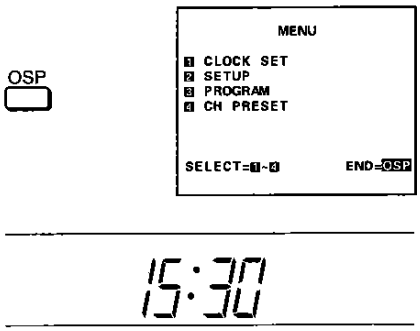
(0)→(5)→(1)→(0)



5 Set the year.
Press the numbers of the last two figures.



6 Press the **OSP** button.
Now the clock starts.



7 Press the **OSP** button to return to the normal TV screen.

Notes
- If you input irregular clock data such as February 29, 1994, it will not be accepted.
- The built-in calendar of this VTR is valid from 1990 to 2089.

Resetting the VTR clock

If a power failure of short duration has occurred, the colon between the hour and minutes digits in the VTR display blinks.
The time displayed may be incorrect.

In this case, you must set the VTR clock again.
Follow the clock setting procedure.

2 SETTING THE SYSTEM SWITCH

It is necessary to set the SYSTEM switch properly to make a recording or a playback of recorded tapes.

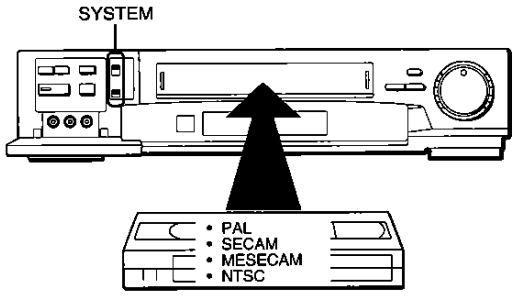
Setting the SYSTEM Switch for Playback

Information

This VTR can play back tapes recorded in the video system of PAL, SECAM, MESECAM or NTSC.
Set the SYSTEM switch according to the video system of a tape you want to play back.

Important

When you play back a tape, make sure that the SYSTEM switch is set properly.



■ **Normally set the SYSTEM switch to "AUTO".**
With "AUTO" set, the VTR automatically detects the video system of a playback tape.
If detecting in "AUTO" may not work owing to inferior quality of the tape, select to "PAL/MESECAM", "SECAM" or "NTSC" according to the video system of the tape.

Video system of a playback tape	SYSTEM switch (AUTO / PAL / • MESECAM • SECAM • NTSC)		(• 3.58 • 4.43)	Output colour	
				Video output (OUT VIDEO)	Aerial output (OUTPUT (TO TV))
	Setting	Position	Position		
PAL	Automatically	AUTO	–	PAL	PAL
	Manually	PAL/MESECAM	–		
MESECAM	Automatically	AUTO	–	SECAM	SECAM
	Manually	PAL/MESECAM	–		
SECAM	Automatically	AUTO	–	SECAM	SECAM
	Manually	SECAM	–		
NTSC	Automatically	AUTO	NTSC 3.58	NTSC 3.58	NTSC 3.58
			NTSC 4.43	NTSC 4.43	NTSC 4.43
	Manually	NTSC	NTSC 3.58	NTSC 3.58	NTSC 3.58
			NTSC 4.43	NTSC 4.43	NTSC 4.43

Notes
- PAL tape : tapes recorded in the PAL video system commercially available on the market, and tapes on which PAL broadcast programmes were recorded.
- MESECAM tape : tapes on which SECAM broadcast programmes were recorded with a MESECAM system VTR.
- SECAM tape : tapes recorded in the SECAM video system commercially available on the market, and tapes on which SECAM broadcast programmes were recorded.
- NTSC tape : tapes recorded in the NTSC video system commercially available on the market, and tapes on which NTSC broadcast programmes were recorded.

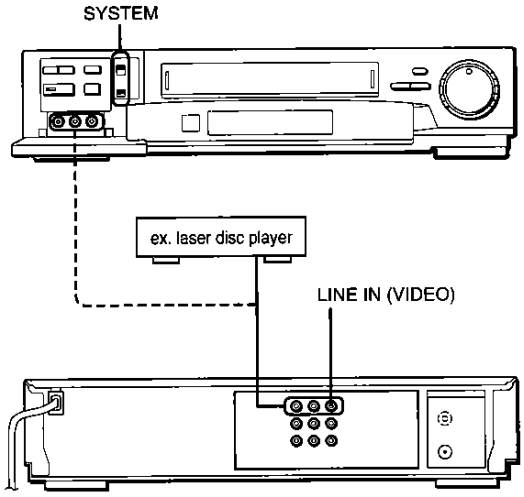
Setting the SYSTEM Switch for Recording

Information

The SYSTEM switch should be set also when you make a TV programme recording or record from an external equipment connected via the LINE IN (VIDEO) jack.

Important

When you make a recording or a timer programme recording, make sure that the SYSTEM switch is set properly.



■ **Normally set the SYSTEM switch to "AUTO".**

With "AUTO" set, the VTR automatically detects the television system of a TV programme or the video system of a source from a connected external equipment.

"PAL/MESECAM", "NTSC" should be set when a TV picture is not good owing to weakness of the receiving TV signal.

Television system	Video system coming from LINE IN jack (LINE IN (VIDEO))	SYSTEM switch (AUTO / • PAL/MESECAM • SECAM • NTSC)		(• 3.58 • 4.43)	Video system recorded on the tape
		Setting	Position	Position	
• PAL I (Hong Kong, South Africa, etc.) • PAL B/G (Singapore, Malaysia, Thailand, etc.) • PAL D (China etc.)	PAL	Automatically	AUTO	–	PAL
		Manually	PAL/MESECAM	–	
• SECAM D/K (Russia etc.) • SECAM B/G (Middle and Near East countries, etc.)	SECAM	Automatically	AUTO	–	MESECAM
		Manually	PAL/MESECAM	–	
			SECAM	–	SECAM
• NTSC-M (U.S., Japan, etc.)	NTSC 3.58	Automatically	AUTO	NTSC 3.58	NTSC
		Manually	NTSC	NTSC 3.58	
	NTSC 4.43	Automatically	AUTO	NTSC 4.43	
		Manually	NTSC	NTSC 4.43	

3 19μ HEAD

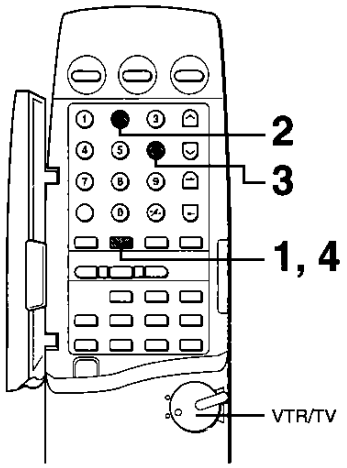
Using the 19μ head, you can view high quality pictures when playing back a tape that has been recorded in the LP or SLP tape speed mode.

Information

This VTR is equipped with a 19μ head which has been designed for use with the LP or SLP tape speed mode. Follow the procedures below and you can get a high quality picture.

Preparation

- Turn on the VTR.
- Select the video channel or video input mode on the TV.
- Set the VTR/TV selector to "VTR".
- Set the SYSTEM switch properly.



Setting the 19μ HEAD for Playback

1 Press the **OSP** button.
The MENU screen appears.

OSP

```
MENU

1 CLOCK SET
2 SETUP
3 PROGRAM
4 CH PRESET

SELECT=1~4          END=OSP
```

2 Press **number button 2** to select "SETUP".

(2)

```
SETUP
1 TAPE SELECT      (E180)
2 NTSC ON PAL TV    (OFF)
3 COLOUR            ( ON)
4 NICAM             ( ON)
5 G-CODE EXTEND     (OFF)
6 19μHEAD          (AUTO)

SET=1-6             END=OSP
```

3 Press **number button 6** to select "AUTO" or "OFF".

(6)

```
SETUP
1 TAPE SELECT      (E180)
2 NTSC ON PAL TV    (OFF)
3 COLOUR            ( ON)
4 NICAM             ( ON)
5 G-CODE EXTEND     (OFF)
6 19μHEAD          (AUTO)

SET=1-6             END=OSP
```

If you select "AUTO", "19μ HEAD" appears in the VTR display.

```
19μHEAD
L
R
```

AUTO: Usually select at this position. You can view a high quality picture while playing back a tape that has been recorded in the LP (PAL/SECAM/MESECAM), SLP (NTSC) mode.

OFF: Use this position if you get some noise in the pictures while playing back a tape which has been recorded with another VTR.

4 Press the **OSP** button twice to return to the normal TV screen.

Note

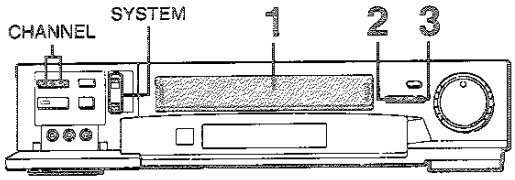
During playback with the 19μ head, momentary noises or shakes may be produced when you change the mode to the picture search or variable speed playback.

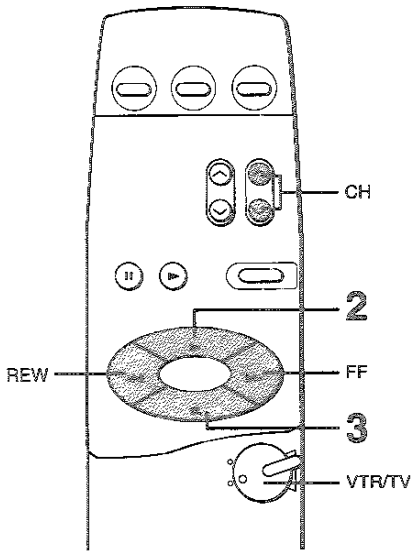
3 PLAYBACK

This section explains a basic playback operation.

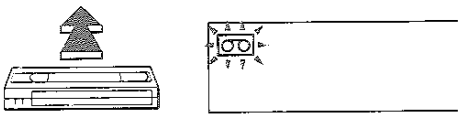
Preparation

- Select the video channel or video input mode on the TV.
- Set the VTR/TV selector to "VTR".
- Set the SYSTEM switch properly.





1 Load a recorded cassette.
The power is turned on.
If the cassette's safety tab is removed, playback starts automatically.

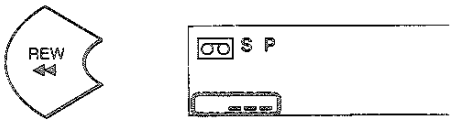


2 Press the **PLAY** button to start playback.

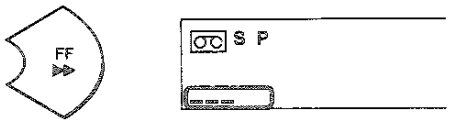
3 Press the **STOP** button when playback is finished.

Playback and recording in LP or SLP mode
When playing back a tape that has been recorded on another VTR, it may happen that the picture colour disappears, the picture becomes unstable and that noise occurs. It is therefore recommended that tapes that have been recorded on this VTR also are played back on this VTR.

■ **Rewinding a video cassette tape:**
Press the **REW** button in the stop mode.



■ **Fast-forwarding a video cassette tape:**
Press the **FF** button in the stop mode.

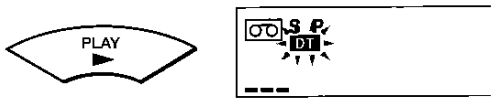


Adjusting the Tracking

The VTR automatically adjusts the tracking for a clear picture and sound.

■ Digital auto tracking

When playback starts, the digital auto tracking is automatically activated. (the "DT" indicator blinking)



Tracking is set when the "DT" indicator stops blinking.

Notes

- While the "DT" indicator is blinking, the playback picture and sound may be distorted.
- The digital auto tracking is activated only in the playback mode.

■ Adjusting the tracking manually

If the VTR cannot find the best possible tracking point, adjust the tracking manually.

Hold down the **CH** button until you can obtain the best possible picture and sound.

Notes

- When you want to reset the tracking point to the center, press both the ∨ and ∧ buttons at the same time.
- The noise on the screen may not be completely removed depending on the tape used, especially when the tape has been recorded on another VTR.

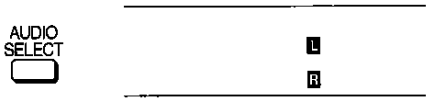
To return to digital auto tracking mode

Hold down simultaneously both **CHANNEL** (∨ / ∧) buttons on the front panel of the VTR for more than 1 second.

The "DT" indicator lights up.

Hi-Fi and Normal Audio System

This unit's Hi-Fi stereo track (2-channel) can be used to playback an excellent Hi-Fi sound. Sound that has been recorded on the normal audio track is compatible with conventional VTR's.
When playing back a Hi-Fi recorded tape, press the **AUDIO SELECT** button to select desired sound output. The L, R indicators in the VTR display tell you what kind of sound output you are selecting. Accordingly, you can select the desired sound output while observing the lit and/or unlit indicators.



CAUTION

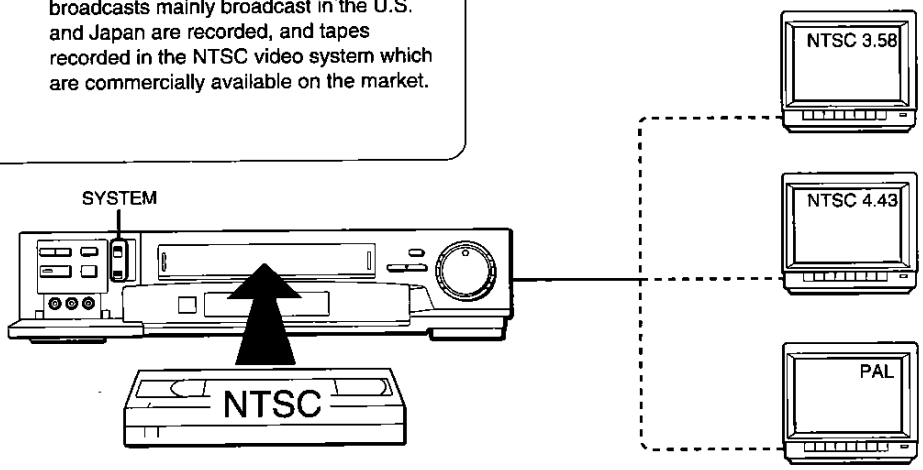
- The VTR has a dynamic range of more than 90dB for Hi-Fi audio capability. It is recommended that you check the maximum level if you are going to listen to the Hi-Fi audio signals through a stereo amplifier. A sudden surge in sound input may cause speaker damage.
- Some speakers and televisions are specially shielded to prevent television interference. If both are of the non-shielded type, do not place the speakers next to a TV set, as the video playback picture may not be normal because of mutual interference.

3 NTSC-RECORDED TAPE PLAYBACK

This VTR can play back an NTSC-recorded tape. You can watch the playback picture on a PAL system TV or an NTSC 3.58/4.43 system TV.

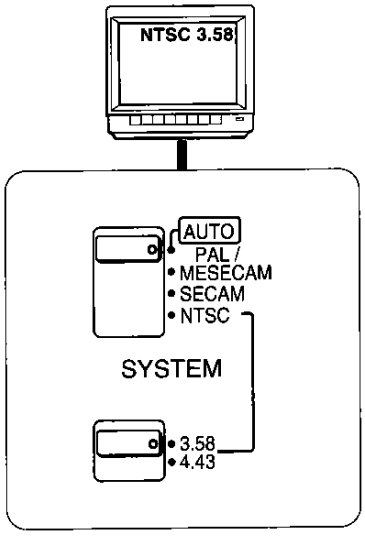
Information

NTSC tape: Tapes on which NTSC M system broadcasts mainly broadcast in the U.S. and Japan are recorded, and tapes recorded in the NTSC video system which are commercially available on the market.



If you connect this VTR to a multi system TV (NTSC 3.58 compatible) and play back an NTSC tape

Set the **SYSTEM** switch to "AUTO – NTSC 3.58" position.



Note

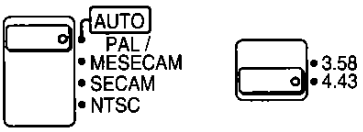
With this VTR, an NTSC tape recorded in the SLP or LP tape speed mode can be played back. But there are some points to be observed.

- The quality of the playback picture and sound are not clear.
- Variable speed playback (picture search, still, slow playback, etc.) can't be performed properly.
- Digital auto tracking may not be performed properly.

If you connect this VTR to a multi system TV (NTSC 4.43 compatible) and play back an NTSC tape

Use both **SYSTEM** switch and SETUP screen for this setting.

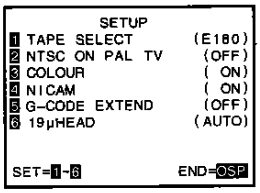
1 Set the **SYSTEM** switch to "AUTO – NTSC 4.43".



2 Press the **OSP** button.
The MENU screen will appear on the TV.

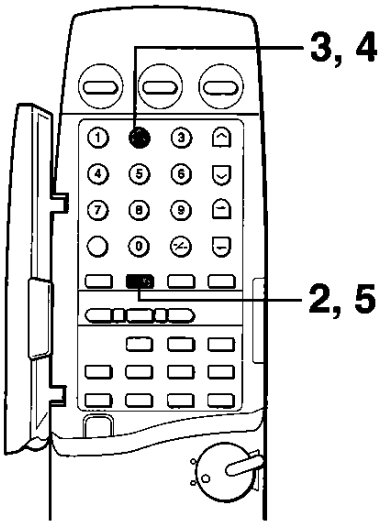
3 Press **number button 2** to select "SETUP".

4 Set "NTSC ON PAL TV" to **"OFF"** by pressing **number button 2**.

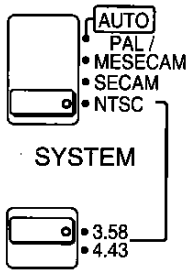


②

5 Press the **OSP** button twice to return to the normal TV screen.

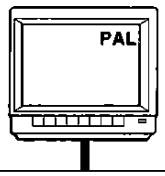


Note on SYSTEM (AUTO/PAL/MESECAM/SECAM/NTSC) switch
Normally set to "AUTO".
With "AUTO" set, the VTR automatically detects video system of the tape. If detecting may not work owing to inferior quality of the tape, set to "NTSC".

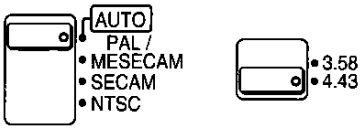


If you connect this VTR to a PAL system TV and play back an NTSC tape

Use both **SYSTEM** switch and SETUP screen for this setting.



1 Set the **SYSTEM** switch to "AUTO – NTSC 4.43".

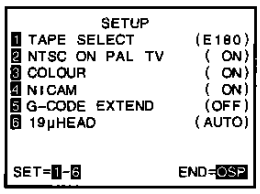


2 Press the **OSP** button.
The MENU screen will appear on the TV.

3 Press **number button 2** to select "SETUP".

4 Set "NTSC ON PAL TV" to **"ON"** by pressing **number button 2**.

(2)



5 Press the **OSP** button twice to return to the normal TV screen.

Notes for Using a PAL TV for NTSC Playback

- Use a TV compatible with PAL video signals of PAL 60 (525 lines).
  When the TV, that is not compatible with PAL video signals of PAL 60, is used (when the TV, that is compatible only with PAL video signals of PAL 50 (625 lines), is used) NTSC playback pictures may roll up and down. This is not malfunction of the VTR or the TV. If your TV is equipped with a V-HOLD control, it may be possible to stop the rolling of pictures by adjusting this control.

  About PAL 50 and PAL 60 of PAL video signals:
  PAL 50 : is a normal signal and its PAL video signal is 50 fields (625 lines).
  PAL 60 : is a special signal and its PAL video signal is 60 fields (525 lines).

  Some TVs operate properly only with PAL 50 signals, some TVs operate properly with both PAL 50 and 60 signals.
  Therefore, if your TV is switchable between PAL 50 (625 lines)/PAL 60 (525 lines), you can view an NTSC recorded tape in the PAL colour system with your own TV.

- Depending on the TV used, the picture may shrink vertically and black bars may appear both at the top and bottom of the TV screen.
  This is not an indication of malfunction.
- Variable speed playback (picture search, still, slow playback, etc.) may produce a skewed image and quite a bit of noise on the picture.
- If the tape pre-recorded in the SP tape speed mode is played back in the picture search mode, the picture may be reproduced with no colour.

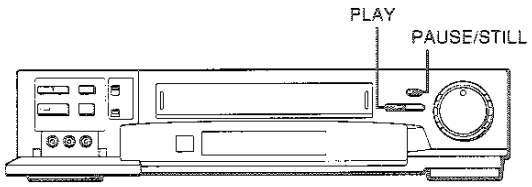
Note
For viewing an NTSC-recorded tape, we recommend using an NTSC 3.58, 4.43 TV.

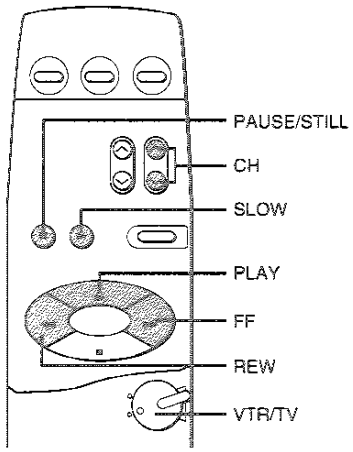
3 VARIABLE SPEED PLAYBACK

You can play back a tape at various tape speeds.

Preparation

- Select the video channel or video input mode on the TV.
- Set the VTR/TV selector to "VTR".
- Set the SYSTEM switch properly.





Picture Search

This function allows you to quickly locate a particular scene or segment on the tape while monitoring the playback picture in the fast-forward or rewind mode.

1 During playback, press the **REW** or **FF** button.
The tape runs at 5 times the normal playback speed.

Playback ⇨ (REW) to reverse picture search
Picture search (5 times)
Playback ⇨ (FF) to forward picture search

2 If you hold down the **REW** or **FF** button in the picture search mode, the searching speed increases.

Reverse picture search (5 times) ⇨ (REW) Hold down.
Picture search (13 times)
Forward picture search (5 times) ⇨ (FF) Hold down.

- When you release the button, the searching speed returns to the 5 times searching speed.

3 To resume normal playback, press the **PLAY** button.

Notes

- The picture will have some interference. This is not a defect in the unit.
- If you play back a tape recorded in the LP or SLP mode or a tape recorded on another VTR in various mode, the picture may be noisy, or monochrome.
- If you press the REW or FF button while rewinding or fast-forwarding the tape, the VTR enters the picture search mode. If you press the REW or FF button while picture searching, the VTR enters the rewinding or fast-forwarding mode, respectively.

Still Picture

This function enables you to freeze a picture so that you can watch important scenes closely.

1 During playback, press the **PAUSE/STILL** button.
The picture freezes.

Playback ⇨ (PAUSE/STILL) to still picture

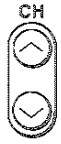
2 To resume normal playback, press the **PAUSE/STILL** button.

Still picture ⇨ (PAUSE/STILL) to normal playback

The still picture mode will be released automatically after approximately 5 minutes. The VTR will then shift to the normal playback mode.

Adjusting still picture stability

If the still picture is distorted or flickers, hold down the **CH** button until the picture becomes stable.



Notes

- The distortion of the still picture may not be eliminated completely if the tape has been recorded on another VTR.
- If you play back a tape recorded in the LP or SLP mode or a tape recorded on another VTR in various mode, the picture may be noisy, or monochrome.
- The still picture may shake if a picture of a fast-moving object or scene is frozen. This is not a defect in the unit.
- If noise appears in the still picture, adjust the tracking manually in the slow-motion picture mode.

Slow-motion Picture

This function has two variations: 1/6th and 1/12th the normal speed.

1 During playback, press the **SLOW** button.
The tape will run at about 1/6th the normal playback speed.

Playback ⇨ SLOW ▶ to 1/6 slow

2 If you press the **SLOW** button again, the tape speed changes to 1/12 slow.

1/6 slow ⇨ SLOW ▶ to 1/12 slow

Each time you press the **SLOW** button, the speed changes between 1/6 and 1/12 alternately.

3 To resume normal playback, press the **PLAY** button.

1/6 slow or 1/12 slow ⇨ PLAY ▶ to normal playback

The slow-motion picture mode will be cancelled automatically after approximately 5 minutes. The VTR will shift to the normal playback mode.

Adjusting the tracking in the slow-motion mode
If the slow-motion picture is noisy, hold down the **CH** button until the best picture is obtained.

Notes
- The slow-motion picture may flicker up and down. This is not a defect in the unit.
- The noise in the slow-motion picture may not be eliminated completely by the tracking adjustment.

Frame Advance

This function allows you to advance the picture frame by frame.

1 During playback, press the **PAUSE/STILL** button to put the VTR in the still picture mode.

Playback ⇨ PAUSE/STILL ▮▮ to still picture

2 Press the **PLAY** button.
The picture advances one frame each time you press the **PLAY** button.

Still picture ⇨ PLAY ▶ to frame advance

When the **PLAY** button is held down, the tape runs at 1/25th the normal playback speed.

3 To resume normal playback, press the **PAUSE/STILL** button.

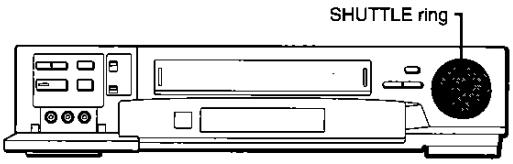
3 SHUTTLE RING OPERATION

You can also activate variable speed playback such as the picture search or slow playback by turning the SHUTTLE ring on the VTR in the stop, playback or still mode.

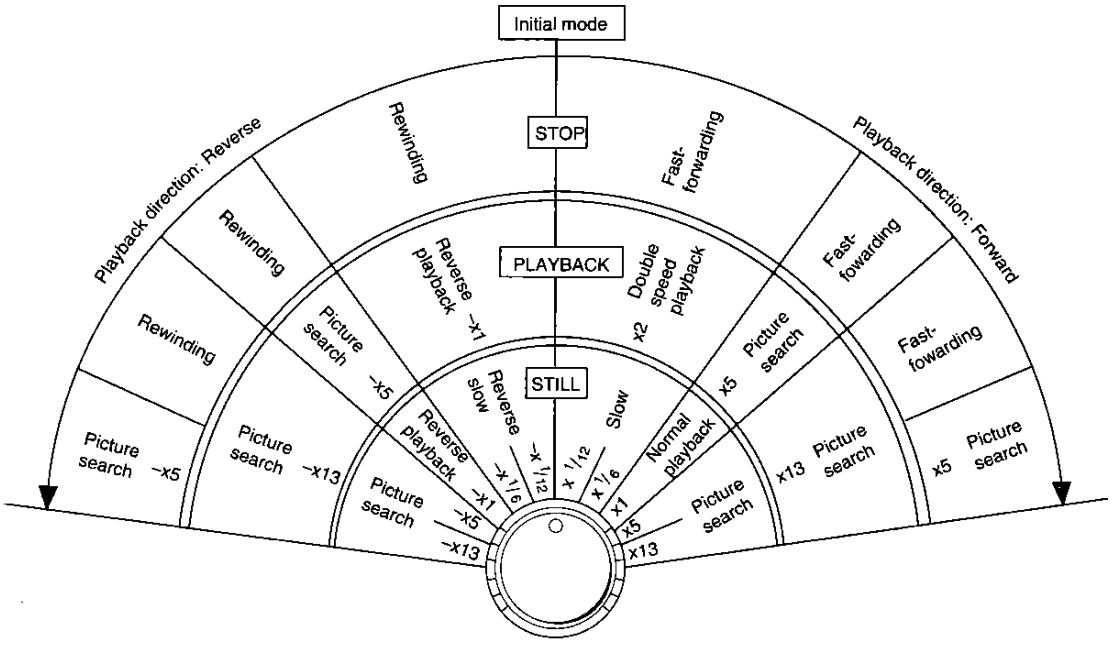
Information

The picture search speed and slow playback speed differ depending on the video system and recording tape speed of the tape used.

	Slow playback		Picture search	Accel. picture search
PAL/SECAM/ MESECAM(SP)	1/12 slow	1/6 slow	x5	x13
PAL/SECAM/ MESECAM (LP)	1/12 slow	1/6 slow	x5	x13
NTSC (SP)	1/15 slow	1/7 slow	x5	x9
NTSC (SLP)	1/15 slow	1/7 slow	x5	x27



■ The diagram below explains for the case of PAL/SECAM/MESECAM tape recorded at SP/LP speed. For NTSC tapes (SP/SLP), see the table above.



Notes

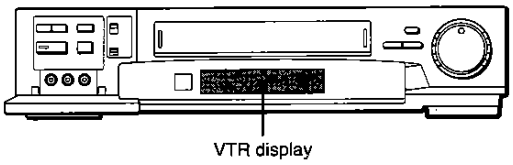
- The still picture mode or reverse playback (-x1) mode will be released automatically after about 5 minutes and forward playback will start.
- The reverse slow playback mode will be released automatically after about 1 minute and forward playback will start.
- Fast-forwarding or rewinding started from the stop mode continues even if the SHUTTLE ring is released. To stop, press the STOP button.

3 COUNTER FUNCTION

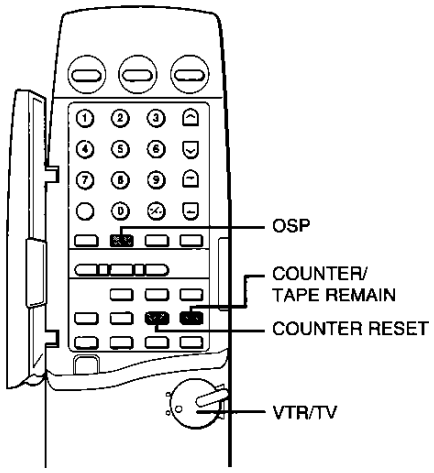
You can see the clock, linear tape counter or tape time remaining in the VTR display.

Preparation

- Set the VTR/TV selector to "VTR".
- Set the SYSTEM switch properly.



VTR display



Changing the Counter Display

Each time you press the **COUNTER/TAPE REMAIN** button, the display changes in sequence as follows:

	VTR display
Linear time counter	1H25M00S minutes hour seconds
Tape time remaining	TR 1H30M
Clock	15:30
Linear time counter	Linear time counter

To reset the linear time counter to "0H00M00S"

The counter is automatically reset to "0H00M00S" when a cassette is ejected. If you want to reset the counter at some other point, for example, when you start a new recording, just press the **COUNTER RESET** button.

Notes

- The linear time counter does not work on non-recorded portions of the tape.
- When the tape is ejected or the VTR is turned off, the linear time counter changes to clock display.
- If the tape rewinds back over "0H00M00S", "—" appears in the VTR display.
- The displayed time of the linear time counter is an approximation.

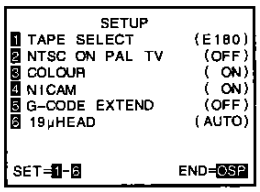
Tape Time Remaining

1 Turn on the VTR and load a cassette.

2 Press the **OSP** button.
The MENU screen will appear on the TV.

3 Press **number button 2** to select "SETUP".

(2)



4 Press **number button 1** and select a tape length, E180, 240, 260 or 300 depending on the tape to be used.
Each time you press **number button 1**, the tape length changes.

(1)

E180: when using an E-195 tape or shorter, and T-120 or shorter.
E240: when using an E-210 or E-240 tape, and T-160.
E260: when using an E-260 tape and T-180.
E300: when using an E-300 tape.

5 Press the **COUNTER/TAPE REMAIN** button.
The tape time remaining is displayed. (See the chart on the left column.)

Notes

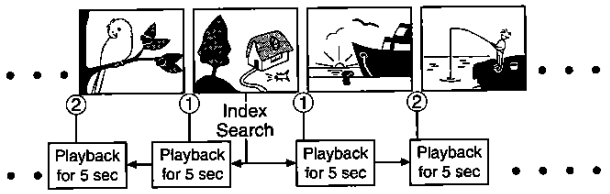
- The displayed time remaining is an approximation.
- The time remaining is calculated according to the tape speed (SP, LP or SLP mode) and the cassette type.
- It is necessary to set the tape length correctly beforehand in step 4 when you use the time remaining display.

3 INDEX SEARCH FUNCTION

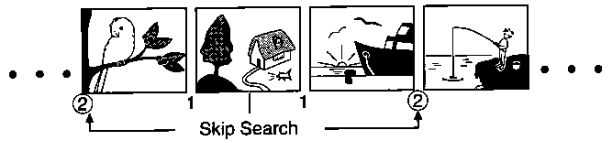
You can easily locate the desired programme using the index signal registered on the tape.

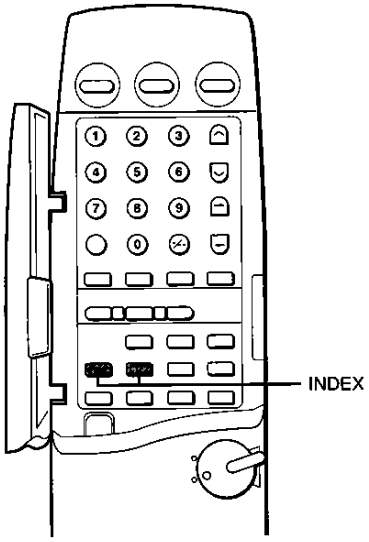
Information

Index Search: Plays back each programme with an index signal for about 5 seconds.



Skip Search : Finds and plays back a programme with an index signal you specified.





Registering the Index Signals Automatically

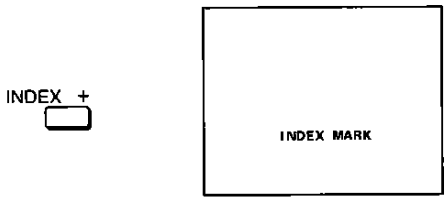
An index signal is automatically registered **when a recording starts.**
An index signal is also registered when one-touch timer recording or timer programme recording starts.

Note
An index signal is not registered automatically when the VTR is in the recording pause mode and recording restarts.

Registering the Index Signals Manually

During recording, index signals can be manually registered at desired points on the tape.

Press the **INDEX** (+) button at the desired point.



Note
When registering two or more index signals, certain intervals are required: more than 1 minute in the SP mode, more than 2 minutes in the LP mode and more than 3 minutes in the SLP mode.

Index Search

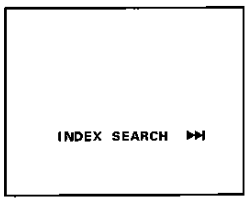
This function plays back the tape for about 5 seconds at each index signal.

1 Load a cassette with the index signals registered.

2 Press the **INDEX** (–) or (+) button while in the stop or playback mode.

– INDEX : to search in the reverse direction

INDEX + : to search in the forward direction



The VTR fast-forwards or rewinds the tape. When an index signal is found, the VTR plays back the tape for about 5 seconds, and then resumes fast-forwarding or rewinding. This operation is repeated at each index signal.

3 Press the **PLAY** button when the desired programme is found.
Normal playback starts.

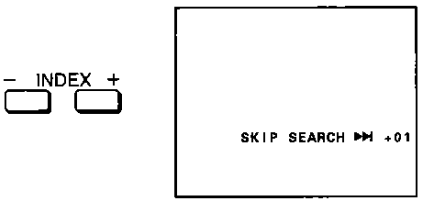
Notes
- At the very beginning of the tape, the index search function may not work correctly.
- If you registered the index signals on a tape recorded on another VTR, the recording may be blurred at the index point and the index search may not work correctly.

Skip Search

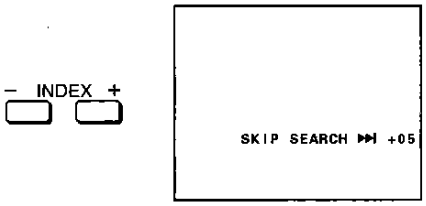
This function fast-forwards or rewinds the tape to the point at which the selected index signal is registered, and starts playback from there.

1 Load a cassette with the index signals registered.

2 Press the **INDEX** (–) or (+) button twice in the stop or playback mode.



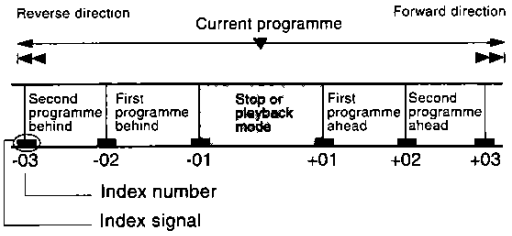
3 Press the **INDEX** (–) or (+) button depending on the direction where your desired programme is located. Each time you press the (–) or (+) button, the number decreases or increases respectively.



The VTR starts to search for the point you specified with the (–) or (+) button. When the point is found, playback will start automatically.

Notes
- You can set an index number up to ±20.
- The skip search is cancelled when the PLAY or STOP button is pressed.

Locating the index number



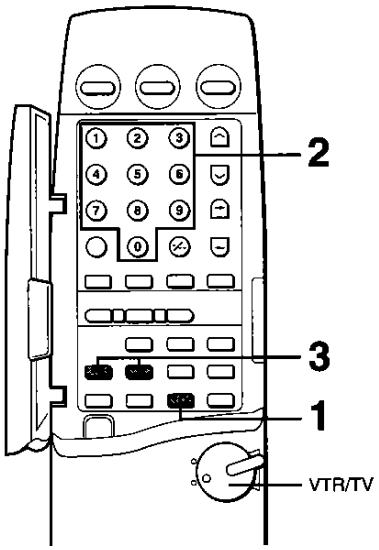
[Example]
- To locate the beginning of first programme behind, press the **INDEX** (–) button three times to set the index number -02.
- To locate the beginning of next programme ahead, press the **INDEX** (+) button twice to set the index number +01.

3 TIME SEARCH FUNCTION

The VTR fast-forwards or rewinds the tape by an amount of time you specified.

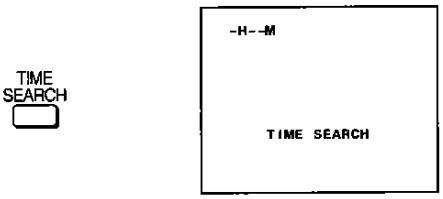
Preparation

- Turn on the VTR.
- Select the video channel or video input mode on the TV.
- Set the VTR/TV selector to "VTR".

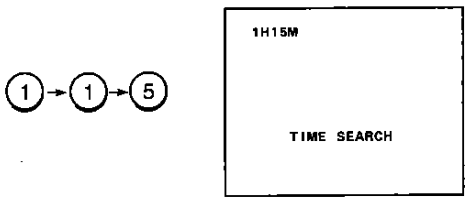


Example **to put ahead 1 hour and 15 minutes**

1 Press the **TIME SEARCH** button in the stop or playback mode.

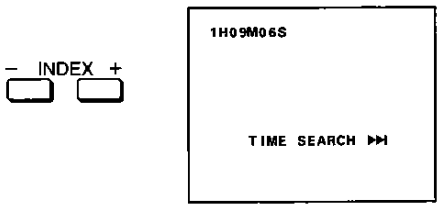


2 Within 10 seconds, press **number buttons** to set the hours and minutes.



To set less than one hour, put 0 for the hours.

3 Press the **INDEX** (–) or (+) button within 10 seconds. Time search starts.



Notes

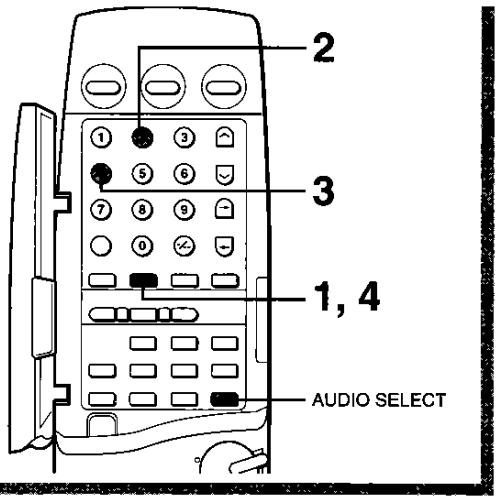
- If you make a time search in the playback mode, playback will start after the search is completed.
- The displayed time is an approximation.

3 NICAM BROADCAST SYSTEM AND SOUND OUTPUT

This VTR incorporates a special decoder that can receive NICAM broadcast programmes.

Information

NICAM Broadcast programme system
NICAM programmes are divided into 3 types. NICAM Stereo, NICAM Mono and Bilingual (transmission in another language). NICAM Programmes are always accompanied by a standard mono sound broadcast and you can select the desired sound with NICAM ON/OFF in the SETUP screen (when recording) or with the AUDIO SELECT button (when playing back).



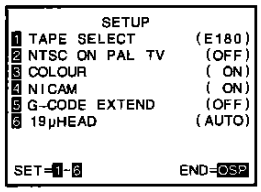
NICAM Broadcast Programme Setting

1 Press the **OSP** button.
The MENU screen appears.

2 Press **number button 2** to select "SETUP".

3 Press **number button 4** to switch "NICAM" to "ON" or "OFF".

④



ON : Normally set at this position.
OFF: Only set at this position to record the standard mono sound during a NICAM broadcast if the stereo sound is distorted due to inferior reception conditions.

4 Press the **OSP** button twice to return to the normal TV screen.

Indicators lit in the TV screen when a NICAM broadcast is received (with NICAM "ON" set)

	TV screen
NICAM Stereo or Mono programme received	NICAM
NICAM Bilingual sound programme received	NICAM I/II
No NICAM programme received Standard mono	Not lit

Monitoring Sound Output

When monitoring a TV programme or playing back a Hi-Fi recorded video tape, press the **AUDIO SELECT** button to select a desired sound output.
Following is a list of monitoring cases when the VTR is connected to a stereo system or stereo TV. As the **AUDIO SELECT** button is pressed, the sound output and the indicator change as below:

Sound type / VTR display	Stereo sound	Bilingual sound	Standard sound broadcast
AUDIO SELECT	Heard in stereo. (left channel and right channel)	Channel I (MAIN) heard from the left speaker, Channel II (SUB) from the right speaker.	Heard in monaural.
AUDIO SELECT	Left channel heard from both the left and right speakers.	Channel I (MAIN) heard from both the left and right speakers.	Heard in monaural.
AUDIO SELECT	Right channel heard from both the left and right speakers.	Channel II (SUB) heard from both the left and right speakers.	Heard in monaural.
AUDIO SELECT Both L and R go off.	Heard in monaural.	Channel I (MAIN) heard from both the left and right speakers.	Heard in monaural.

Sounds of a recorded TV programme
This VTR is capable of recording sound in Hi-Fi system. Stereo broadcasts and bilingual sound broadcasts are recorded in its original sound system. (See the list above).

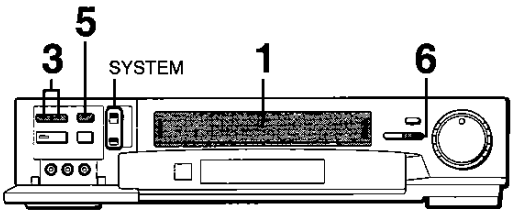
Notes
- When listening to a stereo broadcast or playing back a tape Hi-Fi recorded in stereo. you have to connect the VTR with the stereo audio system or the stereo TV.
  The sound which is output from the AERIAL OUTPUT socket is monaural.
- If a tape which is not Hi-Fi recorded is played back, L, R indicators go off automatically and the sound output is monaural.

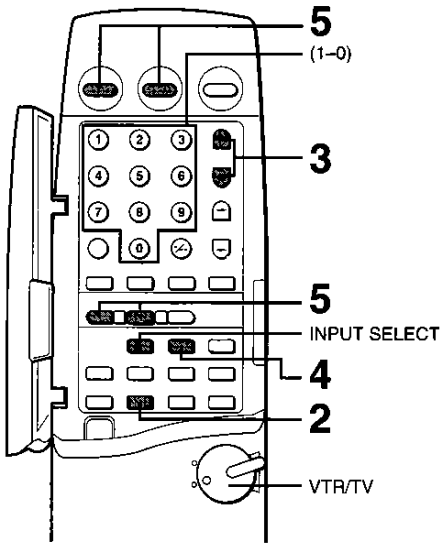
4 RECORDING A TV PROGRAMME

This section explains a basic recording operation.

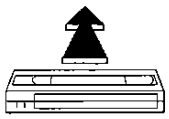
Preparation

- Turn on the VTR.
- Select the video channel or video input mode on the TV.
- Set the VTR/TV selector to "VTR".
- Set the SYSTEM switch properly.





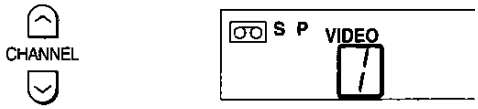
1 Load a cassette with the safety tab attached.



2 Press the **TV/VIDEO** button so that the VIDEO indicator appears in the VTR display.

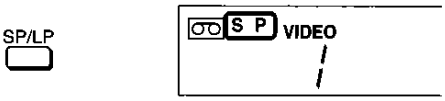
3 Select the TV programme (position number) to record with the **CHANNEL** buttons, or **number buttons (1 – 0)** on the remote controller.

Example : recording a programme of a station stored in position 1



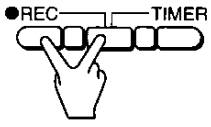
If you find "L1", "L2" or "SA" in the position number area, press the **INPUT SELECT** button so that the position number appears instead.

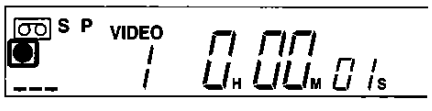
4 Press the **SP/LP** button to select the recording tape speed.



SP: suitable for a general recording with better picture and sound quality. (PAL/SECAM/MESECAM/NTSC)
LP: suitable for doubling recording time, but with less picture quality and sound than using SP mode. (PAL/SECAM/MESECAM)
SLP: suitable for tripling recording time, but with less picture quality and sound than using SP mode. (NTSC)

5 Press the **REC** button on the VTR, or simultaneously press the two **REC** buttons on the remote controller. Recording starts.





6 Press the **STOP** button when recording is finished.

■ **Skipping unnecessary scenes while recording**

1) Press the **PAUSE/STILL** button while recording. Recording stops briefly.

2) Press the **PAUSE/STILL** button again to restart recording.

■ **Changing the recording programme while recording**

1) Press the **PAUSE/STILL** button while recording. Recording stops briefly.

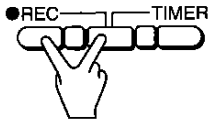
2) Select another TV programme (position number) with **CHANNEL (CH)** button or **number buttons (1 - 0)**.

3) Press the **PAUSE/STILL** button again to restart recording.

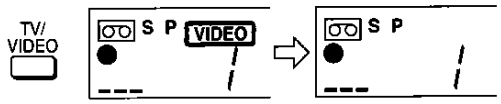
Note
The VTR automatically shifts to the stop mode if the recording pause mode continues for 10 minutes.

Watching Another TV Programme While Recording

1) Follow steps 1 to 5 on the previous page and record a TV programme.



2) Press the **TV/VIDEO** button so that the "VIDEO" indicator disappears in the VTR display.



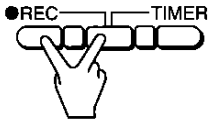
3) While recording, choose another TV programme using the station selector on the TV.

Note
To monitor the programme which is being recorded, press the TV/VIDEO button again so that the "VIDEO" indicator will appear in the VTR display. Select the video channel or video input mode on the TV.

One-touch Timer Recording

While recording, you can set its end time.

1) Follow steps 1 to 5 on the previous page and record a TV programme.



2) Press the **REC** button **on the VTR** to set the recording end time.

Each time you press the **REC** button, the recording end time in the VTR display changes in 30-minute increments up to the maximum of 4 hours later.
(If you press the button further, the one-touch timer recording mode will be cancelled and the indicator shows "–: – –".)

At the recording end time you set, the recording stops and the VTR is turned off automatically.

Notes
- To cancel the one-touch timer recording in progress, press the STOP button.
- To delay the recording end time, further press the REC button on the VTR.
- If the VTR clock is not set, the one-touch timer recording is not activated.
- If the COUNTER/TAPE REMAIN button is pressed in the one-touch timer recording mode, the VTR display changes as below.

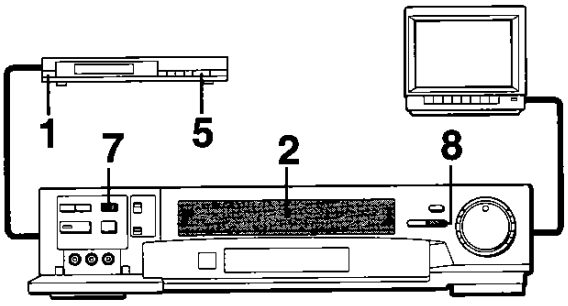
→ recording → clock → linear time counter → tape remaining → end time

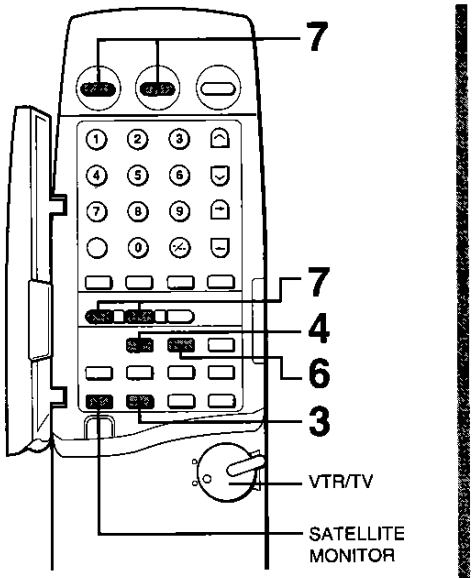
4 RECORDING FROM A SATELLITE RECEIVER

If you are using a satellite receiver, you can connect it to this VTR to record a satellite programme.

Preparation

- Turn on the VTR.
- Select the video channel or video input mode on the TV.
- Set the VTR/TV selector to "VTR".
- Make sure your satellite receiver is connected to the VTR correctly.

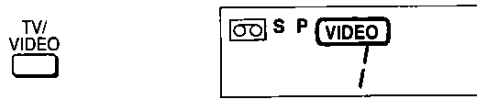




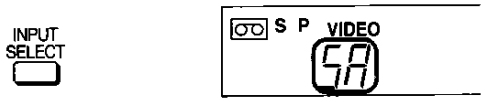
1 Turn on the connected satellite receiver.

2 Load a cassette with the safety tab attached.

3 Press the **TV/VIDEO** button so that the "VIDEO" indicator will appear in the VTR display.



4 Press the **INPUT SELECT** button so that "SA" will appear in the position number area.



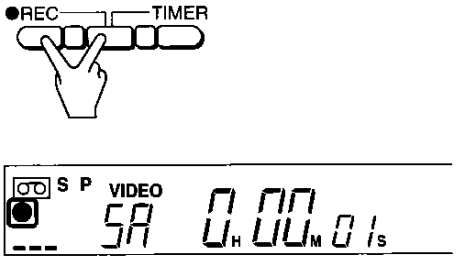
Each time you press the **INPUT SELECT** button, the display changes as shown below.

→ TV (position number) → L1 → L2 → SA (satellite) ┐

5 Choose the satellite programme you want to record using the station selector on the connected satellite receiver.
Make sure that selected programme is on the TV screen.

6 Press the **SP/LP** button to select the recording tape speed.

7 Press the **REC** button on the VTR, or simultaneously press the two **REC** buttons on the remote controller. Recording starts.



8 Press the **STOP** button when recording is finished.

Satellite Monitor Function

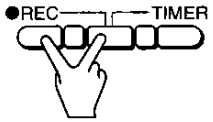
You can watch a satellite programme from your connected satellite receiver even while the VTR is recording a TV programme, or is in the playback or stop mode.

Preparation

Make sure that the satellite receiver, the TV and the antenna are connected properly, using the diagram "Connection to a Satellite Receiver".

■ WATCHING A SATELLITE PROGRAMME WHILE RECORDING A TV PROGRAMME

1) Follow steps 1 to 5 of "RECORDING A TV PROGRAMME" and record a TV programme.



2) Press the **SATELLITE MONITOR** button.
The "MONI" indicator appears.

Each time you press the **SATELLITE MONITOR** button, the "MONI" indicator goes on and off.

3) Choose the satellite programme you want to watch on the connected satellite receiver.

■ WATCHING A SATELLITE PROGRAMME WHILE THE VTR IS IN THE PLAYBACK OR STOP MODE

1) Press the **SATELLITE MONITOR** button so that the "MONI" indicator will appear in the VTR display.

2) Press the **TV/VIDEO** button so that the "VIDEO" indicator will appear in the VTR display.

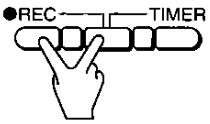
3) Choose the satellite programme you want to watch on the connected satellite receiver.

Notes

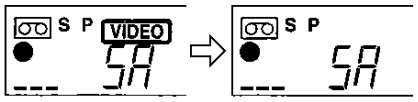
- When OSP mode (ex. the MENU screen is displayed) is set, the satellite monitor function is cancelled.
- The satellite monitor function is also available in the timer programme recording mode or the one-touch timer recording mode.

■ WATCHING A TV PROGRAMME WHILE RECORDING A SATELLITE PROGRAMME

1) Follow steps 1 to 7 of "RECORDING FROM A SATELLITE RECEIVER", and record a satellite programme.



2) Press the **TV/VIDEO** button so that the "VIDEO" indicator disappears in the VTR display.



3) Choose a TV programme you want to watch on your TV handset while recording a satellite programme.

4 G-Code

This VTR is equipped with the G-Code programming system. This system allows you to set up easily for unattended recording.

Information

Before making a G-Code recording, it is necessary to set GUIDE channels to the VTR.

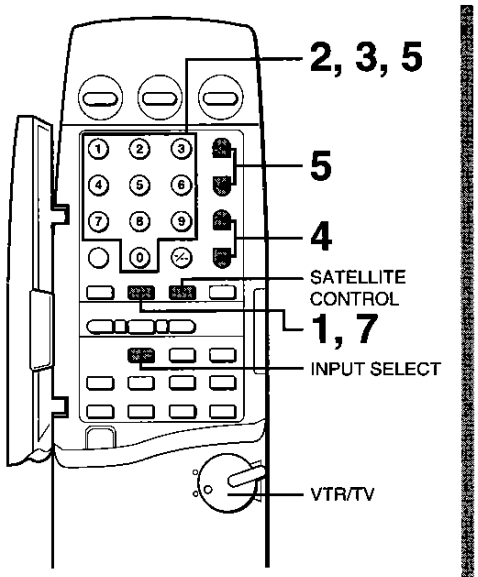
Preparation

- Turn on the VTR.
- Select the video channel or video input mode on the TV.
- Set the VTR/TV select to "VTR".
- Set the SYSTEM switch properly.

Note

The recording systems below are also available on this VTR other than the G-Code recording.

- One-touch timer recording
- Timer programme recording



GUIDE Channel Setting

1 Press the **OSP** button.

OSP

```
MENU
1 CLOCK SET
2 SETUP
3 PROGRAM
4 CH PRESET

SELECT=1-4          END=OSP
```

2 Press **number button 4**.

(4)

```
1 CH MEMORY
2 GUIDE CH SET
3 ANTENNA SELECT    ( SW)
4 RF OUT G/I/K/M      (G)
5 SATELLITE INPUT( SAT )

SET=1-5             END=OSP
```

3 Press **number button 2**.

(2)

```
GUIDE    :   CH P.
  1      :     1
  2      :     2
  3      :     3
  4      :     4
  5      :     5

ENTER CH P. OR LINE
 GUIDE=SHIFT
                END=OSP
```

4 Press the **SHIFT** buttons to select a "GUIDE" according to the list you prepared

TV stations	GUIDE channel	Position number in which the TV station has been memorized on the VTR
HONG KONG & MACAU		
TVB Jade	001	ex. 1
ATV Home	002	ex. 2
TVB Pearl	003	
TDM Chinese Ch	041	ex. 10

Enter the number allocated to each TV station looking up TV magazines, etc.

Example : to set a GUIDE channel 041 of TDM Chinese Ch.

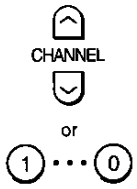
SHIFT

```
GUIDE    :   CH P.
  39     :     39
  40     :     40
  41     :     41
  42     :     42
  43     :     43

ENTER CH P. OR LINE
 GUIDE=SHIFT
                END=OSP
```

5 Enter the position numbers (1 to 48) in which you have stored TV stations on the VTR, in the "CH P." column.

Example : If you stored TDM Chinese Ch in position 10, enter 10 in the "CH P." column by using the **CHANNEL** or **number buttons**.



GUIDE	:	CH P.
39	:	39
40	:	40
41	:	10
42	:	42
43	:	43

ENTER CH P. OR LINE
GUIDE=SHIFT
END=OSP

6 To set GUIDE channels for other TV stations, follow steps 4 and 5.

7 Press the **OSP** button three times, to return to normal TV screen.
GUIDE channel setting is all completed.

GUIDE Channel Setting For Satellite Station

Example: to set a GUIDE channel 005 of Prime Sports.

In step 4, press the SHIFT buttons to move the reversed cursor to "5" on the "GUIDE" column.

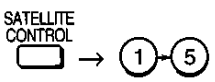
If the model of your satellite receiver is one of the TOSHIBA satellite receivers, **follow procedure A.**
If your satellite receiver is of a model other than those, **follow procedure B.**

A) Using this setting, the VTR can make a G-Code recording of satellite programmes while you are absent, selecting automatically satellite channels as you have set.

Important

To use this function, make the procedures for the "SATELLITE RECEIVER CONTROL".

1) Enter a channel of the satellite station in the "CH P." column by pressing first the **SATELLITE CONTROL** button (SA displayed), and then **number buttons**.
If Prime Sports is channel 15...



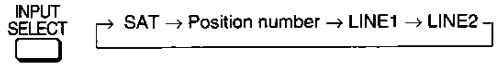
GUIDE	:	CH P.
3	:	3
4	:	4
5	:	SA15
6	:	6
7	:	7

ENTER SAT CHANNEL
GUIDE=SHIFT
END=OSP

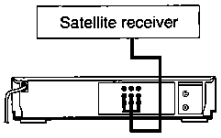
2) Press the **OSP** button three times to return normal TV screen. To set GUIDE channels for other satellite stations, follow above.

B) The VTR cannot select automatically satellite channels in the G-Code recording mode. It is necessary to select a desired satellite channel using the station selector on your satellite receiver when you make a G-Code recording.

1) Set the "CH P." column using the **INPUT SELECT** button according to the connection of your satellite receiver and the VTR.



If your satellite receiver is connected via . . .

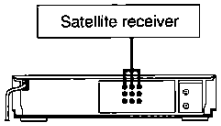


SAT. IN (AUDIO/VIDEO) jacks,

set to "SAT".

GUIDE	:	CH P.
3	:	3
4	:	4
5	:	SAT
6	:	6
7	:	7

ENTER CH P. OR LINE
GUIDE=SHIFT
END=OSP

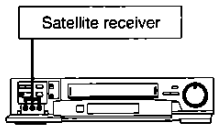


LINE IN (AUDIO/VIDEO) jacks,

set to "LINE1".

GUIDE	:	CH P.
3	:	3
4	:	4
5	:	LINE1
6	:	6
7	:	7

ENTER CH P. OR LINE
GUIDE=SHIFT
END=OSP

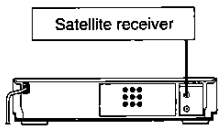


LINE IN 2 (AUDIO/VIDEO) jacks,

set to "LINE2".

GUIDE	:	CH P.
3	:	3
4	:	4
5	:	LINE2
6	:	6
7	:	7

ENTER CH P. OR LINE
GUIDE=SHIFT
END=OSP



AERIAL INPUT socket (see page 15),

as you have allowed position number 10 on the VTR for satellite output, enter 10 using number buttons.

GUIDE	:	CH P.
3	:	3
4	:	4
5	:	10
6	:	6
7	:	7

ENTER CH P. OR LINE
GUIDE=SHIFT
END=OSP

2) Press the **OSP** button three times to return normal TV screen. To set GUIDE channels for other satellite stations, follow above.

Your G-Code programming is now ready to be used.

4 G-Code

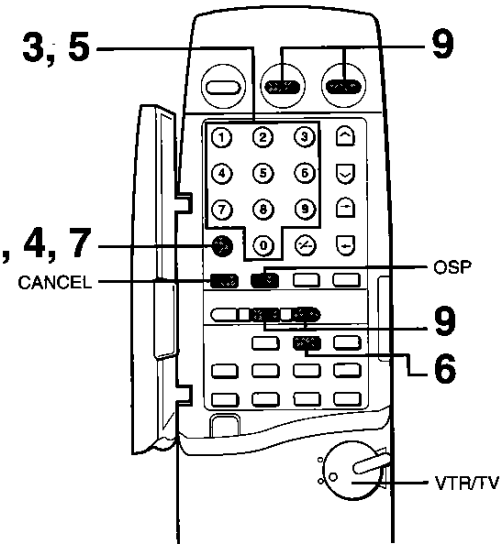
After having setting GUIDE channels, you can perform G-Code recording using the G-Code numbers.

Information

You can perform timer recording very easily using the G-Code programming system of this VTR.
You simply enter G-Code numbers carried on the daily newspapers or TV directories.

Preparation

- Make sure that the clock is set correctly.
- If you record from a satellite receiver, make sure that the connection is made correctly.
- Set the VTR/TV selector to "VTR".



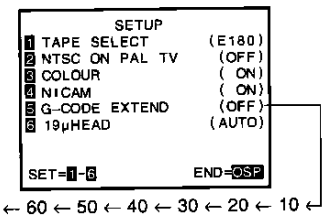
Setting Time Extension

Before making a G-Code recording, set possible time extension for the recording to allow for programm's overrunning. You can extend the recording time in 10 minute increments up to 60 minutes.

1) Press the **OSP** button.
The MENU screen appears on the TV.

2) Press **number button 2** to select "SETUP".

3) Press **number button 6** repeatedly to set desired time extension.


SETUP
1 TAPE SELECT (E180)
2 NTSC ON PAL TV (OFF)
3 COLOUR (ON)
4 NICAM (ON)
5 G-CODE EXTEND (OFF)
6 19μHEAD (AUTO)
SET=1-6
END=OSP
OFF ← 60 ← 50 ← 40 ← 30 ← 20 ← 10 ←

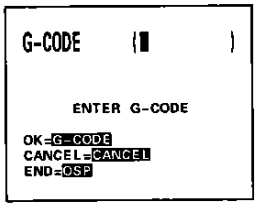
Notes

- Extend time should be set before starting G-Code recording procedure.
  The time extending doesn't work on recording programmes already memorized.
- When you do not use time extension for G-Code recording, set to "OFF" on the SETUP screen.

G-Code Recording Procedure

1 Load a cassette with the safety tab attached.

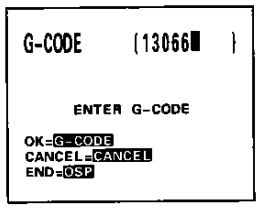
2 Press the **G-CODE** button.
The VTR enters the G-Code mode.



3 Enter the G-Code number (allocated to each TV programme carried on TV magazines).

Example : To record a TV programme beginning at 20:30 on 8, October, 1994 with G-Code number 13066 (fiction).

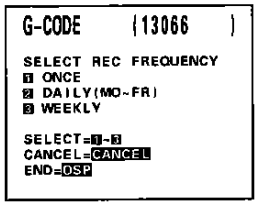
Press **number button 1, 3, 0, 6 and 6.**
Confirm that the entered number is correct.



Correcting a mistake

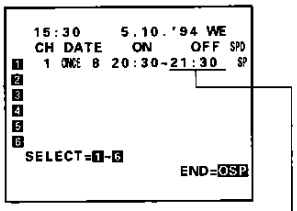
- Press the CANCEL button. The current G-Code number is cleared.
- Re-enter a correct G-Code number.

4 Press the **G-CODE** button.
The TV screen changes as follows:
(Some TV programmes may not require the selection on the screen below, and skip automatically to step 6 when its G-Code number is entered.)



ONCE: one-time recording.
DAILY (MO~FR): records TV programmes on the same TV station at the same time Monday through Friday.
WEEKLY: records TV programmes on the same TV station at the same time on the same day every week.

5 To select "ONCE" for example, press **number button 1**.
The "ONCE" programming has been made automatically.
Programme details are shown.



ex. When you set 10 minutes time extension on the SETUP screen, the "OFF" displays 21:40.

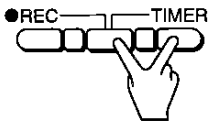
6 To change the tape speed, press the **SP/LP** button.

Note
When you want to record in the SLP mode in the NTSC video system, press the SP/LP button to select "LP".

7 Press the **G-CODE** button.
Programme setting is now memorized.

8 To enter other G-Code numbers, follow steps 2 to 7.

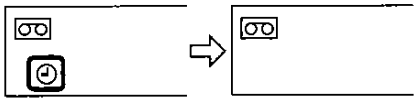
9 Finally press the two **TIMER** buttons simultaneously.
The VTR enters the timer standby mode and ⏲ indicator lights up.



Recording or Playback in the Timer Standby Mode

When you want to use the VTR while it is set to the timer standby mode, proceed as follows:

1) Press the **TIMER** buttons simultaneously.
⏲ indicator goes off.



2) Press the **ON/STANDBY** button to turn on the VTR and operate the VTR as usual.

3) After operating the VTR, press the **TIMER** buttons.
The VTR returns to the timer standby mode.

Finish normal use of the VTR before the preset recording start time, since the timer only works when the VTR is in the timer standby mode.

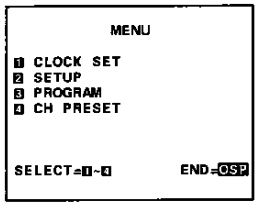
4 G-Code

Confirming the G-Code Timer Programmes

■ To confirm the G-Code recording programme before the VTR enters the timer standby mode (◴ indicator not lit)

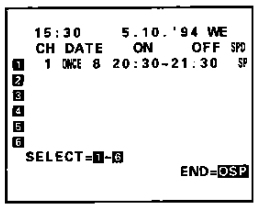
1) Press the **OSP** button.

OSP



2) Press **number button 3.**

③

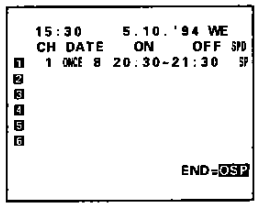


Check your programme data.

3) Press the **OSP** button twice.
The TV screen returns to the normal screen.

■ To confirm during the timer programme recording (◴ indicator lit)
Press the **OSP** button so that the screen for confirming appears. After about 30 seconds, the screen disappears.

OSP



Cancelling the G-Code Timer Programmes

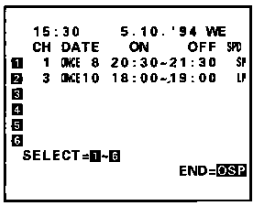
Preparation

If the VTR is set to the timer standby mode, (◴ indicatior lit), press the TIMER buttons to release it and press the ON/STANDBY button.

1) Press the **OSP** button to display the MENU screen.

2) Press **number button 3.**

③



3) Select a programme number which you want to cancel by using number buttons.

① • • • ⑥

4) Press the **CANCEL** button.
The selected programme data is cancelled.

CANCEL

5) Press the **OSP** button.

6) If necessary, press the **TIMER** buttons to return to the timer standby mode.

Changing the G-Code Timer Programmes

Preparation

First cancel the timer programme. (See "Cancelling the G-Code Timer Programmes".)

1) Press the **G-CODE** button so that the G-Code screen appears.
Enter a new G-Code number in the same way as previously described.

2) Press the two **TIMER** buttons simultaneously to enter the timer standby mode.

Additional Information

Error indicators
When the "FULL (CLEAR PROG.)" message appears on the TV during programming, no more programmes can be entered. If you want to add another programme, delete one existing programme on the screen by using number button.

If impossible G-Code number is entered, "INVALID CODE ENTERED" blinks on the screen to tell you that the recording cannot be performed. Press the CANCEL button to clear the G-Code number and enter correct one.

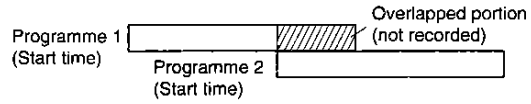
If "CLASH" message appears on the screen during programming, it tells you that two programmes with the same recording start time have been entered. You have to make a correction. On this screen, blinking item number means that the item has been entered later.

1) Enter the number of the programme you want to correct using **number buttons.**

2) Correct the timer programme data, or clear the data by pressing the **CANCEL** button and then press the **G-CODE** button to enter the G-Code.

Overlaps the programme
If two programmes overlap, the recording start time of programme 2 has a priority over the recording end time of programme 1.

Example: when programme 2 overlaps programme 1



4 TIMER PROGRAMME RECORDING

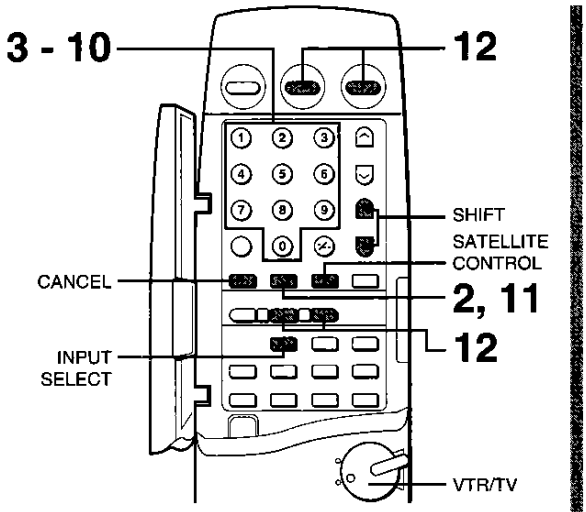
The programmable timer allows you to record up to 6 different programmes over one month. This function is convenient when you are away from home or when you are busy.

Information

The item to be set blinks. Set the data with the number buttons, following the blinking position.
You can change the blinking position by pressing the SHIFT (→/←) buttons.

Preparation

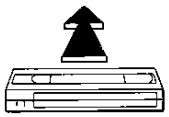
- Turn on the VTR.
- Select the video channel or video input mode on the TV.
- Make sure that the clock is set correctly.
- Set the VTR/TV selector to "VTR".
- Set the SYSTEM switch properly.



Example

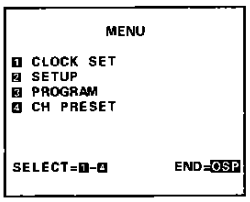
to record a programme of a station with TV channel number 26 stored on position number 1 in the SP mode from 20:30 until 21:30 on October 8. Today is October 5.

1 Load a cassette with the safety tab attached.



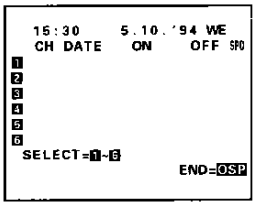
2 Press the **OSP** button.

OSP



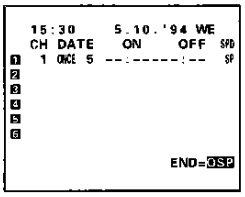
3 Press **number button 3.**

(3)



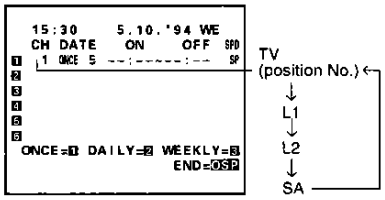
4 Select programme number 1.

(1)



5 Select position number 1.
Press **number button 0 and 1.**

(0)→(1)



You can make a timer programme recording of a source programme from other equipment connected to this VTR using the **INPUT SELECT** button.

- L1 : to record from other equipment connected to the LINE IN jacks on the rear panel of this VTR.
- L2 : to record from other equipment connected to the LINE IN 2 jacks on the front panel of this VTR.
- SA : to record from the satellite receiver connected to the SAT. IN jacks on the rear panel of this VTR.

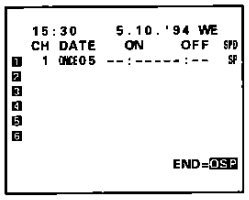
If you press the **SATELLITE CONTROL** button, the VTR enters the satellite receiver control mode and "SA" is displayed. Enter a desired satellite station.

SATELLITE CONTROL → ex. (1)→(2)

Correcting a mistake
Press the SHIFT (←) button to reverse the blinking position until the number you set incorrectly blinks. Correct the number with the number buttons and press the SHIFT (→) button to return the blinking digit.

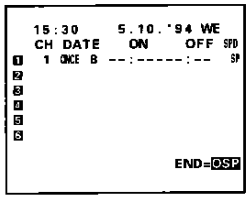
6 Select a one-time recording.
You can also set daily and weekly timer recordings.

(1)



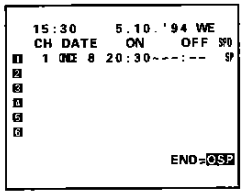
7 Set the recording date.

(0)→(8)



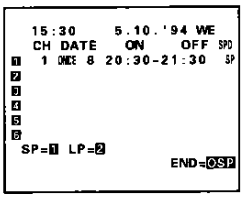
8 Set the hours and minutes of the recording start time.

(2)→(0)→(3)→(0)



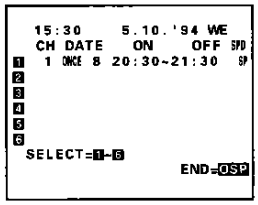
9 Set the hours and minutes of recording end time.

(2)→(1)→(3)→(0)



10 Select the tape speed (SP).

(1)



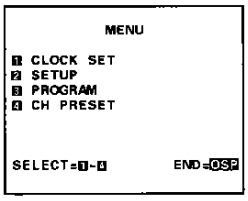
1 = SP : Select for a recording with better picture and sound.
2 = LP : Select for doubling recording time, but with less quality of picture and sound than using the SP mode.

When you want to record in the SLP mode in the NTSC video system, press number button 2 to select "LP".

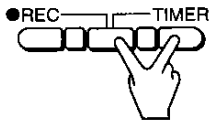
To set another programme, follow steps 4 to 10. (For this example, since programme number 1 is already used, set another programme using programme numbers 2, 3 ... 6 in step 4.)

11 Press the **OSP** button.
Programme setting is complete.

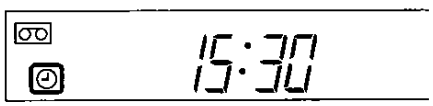
OSP



12 Press the two **TIMER** buttons simultaneously.



The power will be turned off and the VTR enters the timer standby mode.

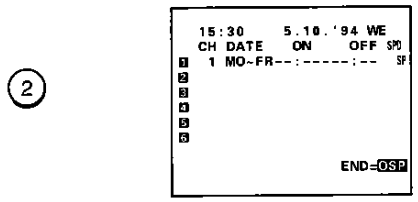


4 TIMER PROGRAMME RECORDING

Daily and Weekly Recording

■ **Daily timer programme recording**
You can record TV programmes on the same TV station at the same hour Monday through Friday.

1) In step 6 on the previous page, press **number button 2** to select DAILY.

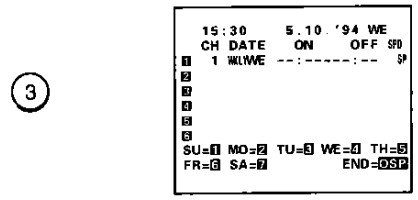


2) Skip step 7.

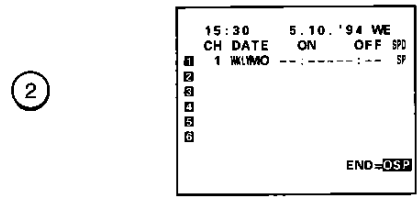
3) Perform steps 8 to 12.

■ **Weekly timer programme recording**
You can record TV programmes on the same TV station on the same day every week.

1) In step 6 on the previous page, press **number button 2** to select WEEKLY.



2) Press **number buttons 1 to 7** to select the day of the week.
For example, if you press **number button 2** to select "MO", you can record the programme on the same TV station on the same time every Monday.



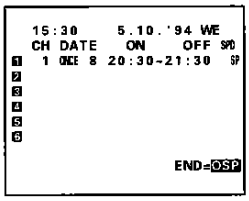
3) Skip step 7.

4) Perform steps 8 to 12.

Confirming the Timer Programmes

To confirm during the timer programme recording (◴ indicator lit)
Press the **OSP** button so that the CONFIRM screen appears. After about 30 seconds, the screen disappears.

OSP



Changing the Timer Programme

Preparation
If the VTR is set to the timer standby mode (◴ indicator lit), press the TIMER buttons to release it and press the ON/STANDBY button.

1) Perform steps 2 to 12 of the timer programme setting procedure to correct timer programme data.
   - In step 4, select a programme number which you want to correct.

2) Press the **TIMER** buttons simultaneously to return the VTR to the timer standby mode.

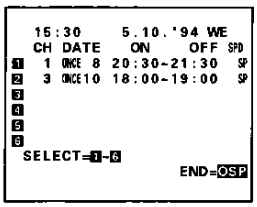
Cancelling the Timer Programmes

Preparation

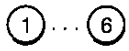
If the VTR is set to the timer standby mode (⏲ indicator lit), press the TIMER buttons to release it and press the ON/STANDBY button.

1) Press the **OSP** button to display the MENU screen.

2) Press **number button 3** to select "PROGRAM".



3) Select a programme number which you want to cancel by using number buttons.



4) Press the **CANCEL** button.
The selected programme data is cancelled.

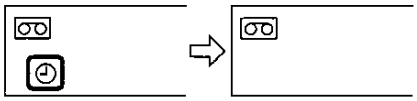
5) Press the **OSP** button again.

6) If necessary, press the **TIMER** buttons to return to the timer standby mode.

Recording or Playback in the Timer Standby Mode

When you want to use the VTR while it is set to the timer standby mode, proceed as follows:

1) Press the **TIMER** buttons simultaneously.
⏲ indicator goes off.



2) Press the **ON/STANDBY** button to turn on the VTR and operate the VTR as usual.

3) After operating the VTR, press the **TIMER** buttons.
The VTR returns to the timer standby mode.

Finish normal use of the VTR before the preset recording start time, since the timer only works when the VTR is in the timer standby mode.

Additional Information

Error indicator

The "E" (error) indicator appears in the VTR display if you press the TIMER buttons when:
— a cassette is not loaded.
— a cassette without a safety tab is loaded.
— a cassette with a safety tab is loaded and no timer programmes are set on the VTR.
In these cases, a recording will not be made.

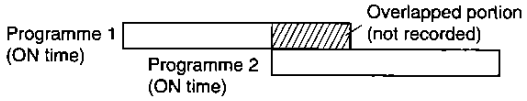
If a power failure occurs during timer programme recording

- After a power failure of short duration, the colon between the hour and minute digits blinks in the VTR display. This indicates that the timer programmes are still in the memory of the VTR.
- After a power failure of long duration, "0:00" blinks in the VTR display. This indicates that the timer programmes have been cleared. Reset the clock and timer programmes on the VTR.

Overlap of the programmes

If two timer programmes overlap, the recording ON time of programme 2 has priority over the recording OFF time of programme 1.

Example : when programme 2 overlaps programme 1



4 SATELLITE RECEIVER CONTROL

The VTR can directly control station selecting of the connected TOSHIBA satellite receiver.

Information

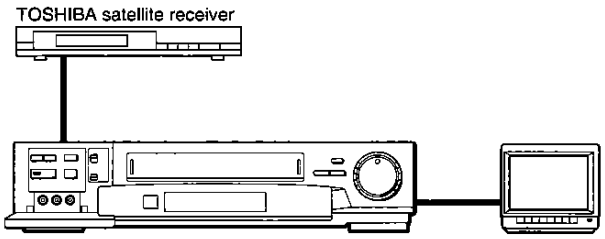
You can select satellite stations by operating this VTR. It is also possible to change automatically satellite stations according to your programme setting in the timer recording mode. See "TIMER PROGRAMME RECORDING".

Preparation

- Make sure your satellite receiver is connected to the VTR correctly.
- Set the VTR/TV selector to "VTR".

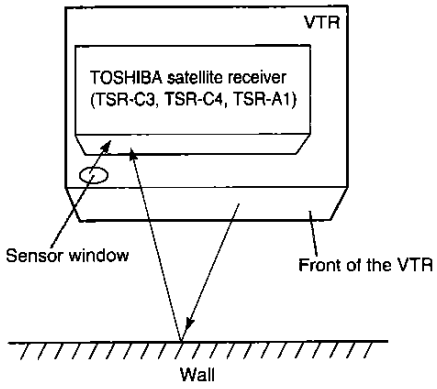
Important

- This function is applicable on the TOSHIBA satellite receivers, TSR-C3, TSR-C4 and TSR-A1 only.
- Keep the connected satellite receiver turned on.



Placing the Satellite Receiver

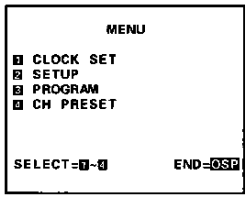
Put the TOSHIBA satellite receiver on the top of the VTR as shown below.
Do not block the sensor window.



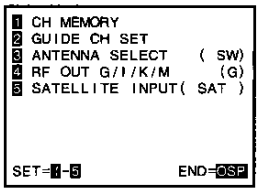
The infrared signals come out of the sensor window and the front of the VTR, and they bounce off walls and objects in the room and are received by the satellite receiver.
The VTR sends out infrared control signals to your satellite receiver even during timer programme recording.

Setting the Satellite Receiver Control

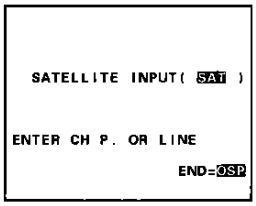
1 Press the **OSP** button.

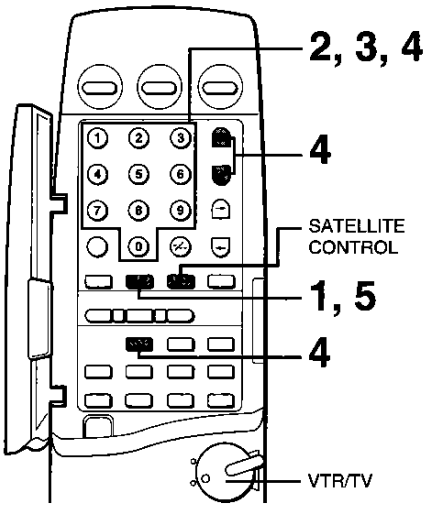


2 Press **number button 4**.



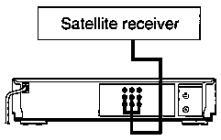
3 Press **number button 5**.

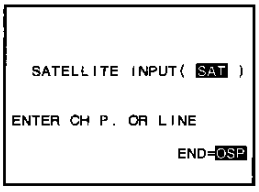




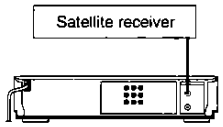
4 Set the position number or line input mode depending on your satellite receiver connection.
If your satellite receiver is connected via . . .

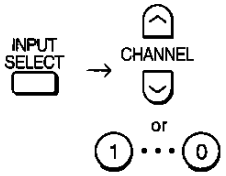
the SAT. IN (AUDIO/VIDEO) jacks on the VTR, press the **INPUT SELECT** button to select "SAT".

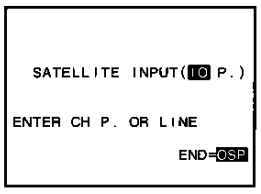




the AERIAL INPUT socket, press the **INPUT SELECT** button, and then set the position number on which you stored the satellite output by using the **CHANNEL** or **number buttons.**







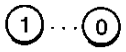
5 Press the **OSP** button three times to return to the normal TV screen.
The satellite receiver control function is ready to use.

Using the Satellite Receiver Control

■ SELECTING SATELLITE STATIONS WITH THE REMOTE CONTROLLER OF THE VTR

1) Press the **SATELLITE CONTROL** button to make "SAT", "SA" appear in the VTR display.

2) Select a desired satellite station using **number buttons.**



Notes
- Each time the SATELLITE CONTROL button is pressed, this function goes on or off.
- To make a position number appear in the VTR display after you have cancelled this function, press the INPUT SELECT button.

■ CHANGING SATELLITE STATIONS AUTOMATICALLY IN THE TIMER PROGRAMME RECORDING MODE

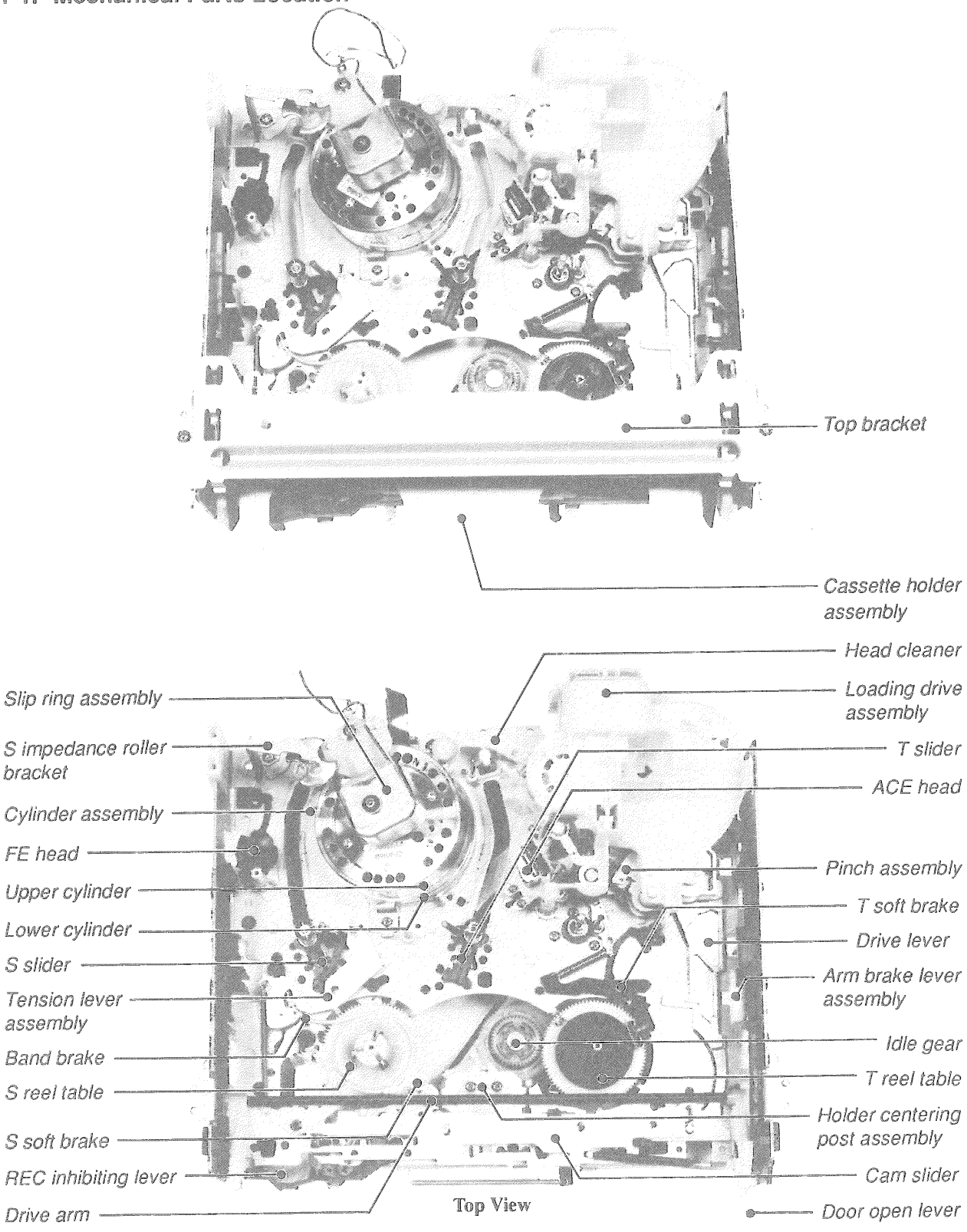
See "TIMER PROGRAMME RECORDING" on page 53.
Go through steps **1)** and **2)** above beforehand and confirm that stations are properly selected.

Note
Keep the satellite receiver turned on even while the VTR is in the timer programme recording mode.

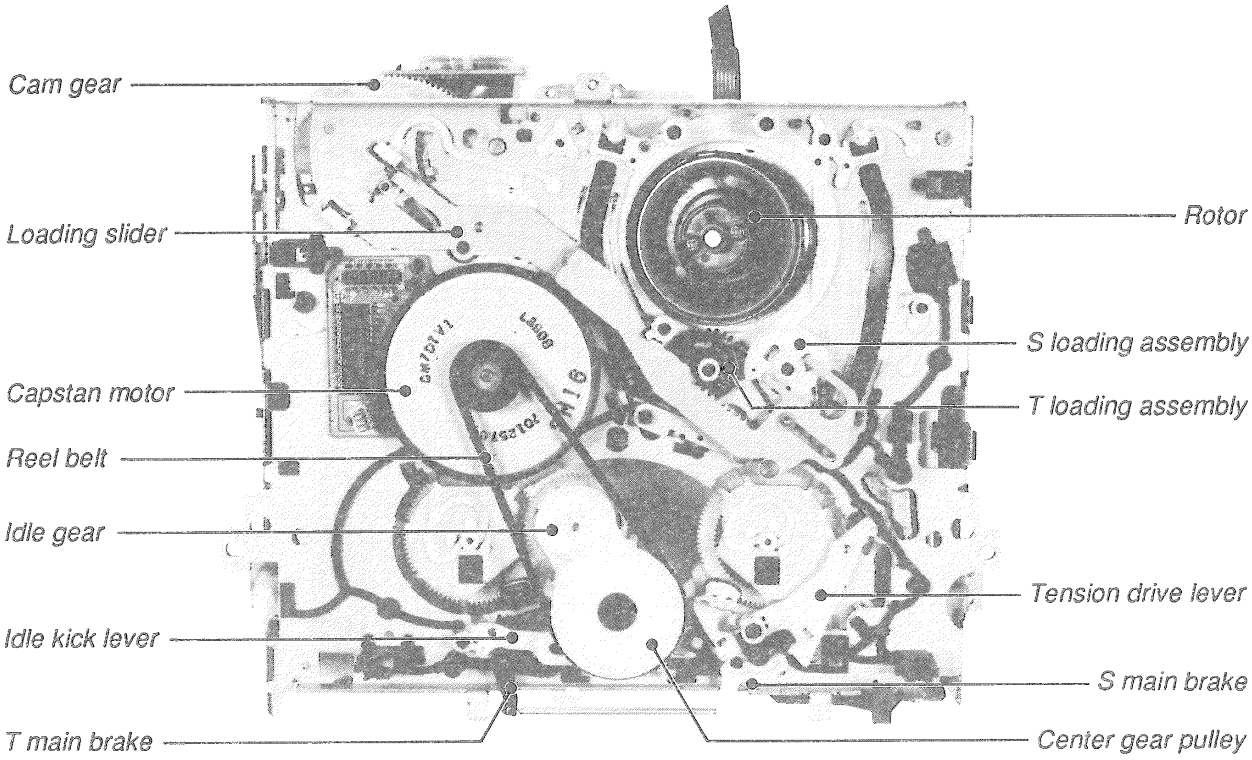
SECTION 2
ADJUSTMENT PROCEDURES

1. MECHANICAL ADJUSTMENT

1-1. Mechanical Parts Location

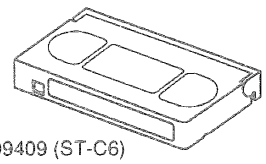
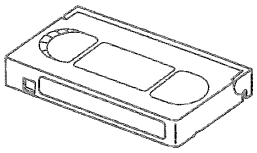
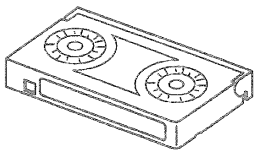
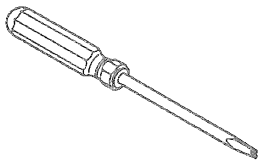
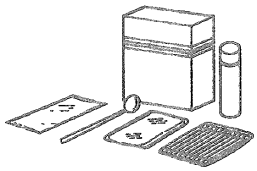
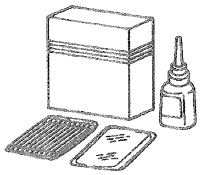


Top View



Bottom View

1-2. Servicing Jig List

Alignment tape  70909409 (ST-C6) 70909410 (ST-C7)	Back tension cassette gauge  70909103	Torque cassette gauge (KT-300NR)  70909199
Taper nut driver  70909228	VTR cleaning kit 	VTR lubrication kit 
Grease 		

Note: Conventional alignment tapes ST-C1 (70909227) and ST-C3 (70909264) can be used partially.

1-3. Main Parts Servicing Time

- Part replacement time differs from servicing life time of each part.
- Following table is prepared based on a standard condition (room temperature, room humidity). The replacement time will be varied depending upon operation environment, using methods, operation duty, etc.
- Particularly, life of the upper cylinder depends upon operation conditions.

	Part Name	Service time (Operating Hours)										Note
		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
Tape Transport System	Tension post	△	△	△	△	△	△	△	△	△	△	• When cleaning, use a swab or piece of gauze soaked in alcohol. • After cleaning, cleaned parts are dried comepletely, and then load a video cassette.
	S/T slant guide post											
	Impedance roller *											
	No. 8 guide post											
	Capstan											
	No. 9 guide post											
	No. 3 guide post											
	S/T guide roller	△	△	△	O	O	O	O	O	O	O	• When lubricating, always use the specified oil. • When the lubricating, apply one or two drops of oil after the cleaning with alcohol.
	Upper cylinder	△	O	O	O	O	O	O	O	O	O	
	Slip ring assembly		O	O	O	O	O	O	O	O	O	
	FE head	△	△	△	O	O	O	O	O	O	O	
	ACE head	△	O	O	O	O	O	O	O	O	O	
	Pinch roller	△	O	O	O	O	O	O	O	O	O	
Tape Drive System	Capstan motor	△	△	△	△	△	O	O	O	O	O	• Check the back tension.
	Loading motor				O	O	O	O	O	O	O	
	Loading belt/ Reel belt	△	O	O	O	O	O	O	O	O	O	
	S reel table assembly		O	O	O	O	O	O	O	O	O	
	T reel table assembly		O	O	O	O	O	O	O	O	O	
	Idle gear assembly	△	O	O	O	O	O	O	O	O	O	
Other	Band brake assembly		O		O		O		O		O	

△ : Cleaning O : Check and replace if necessary

* There are two types. One type has an impedance roller and another type has no impedance roller.

1-4. V3 Mechanism Check Method

If the abnormal condition is caused by the mechanism itself, analyze the cause according to the following procedures.

1-4-1. External Appearance Check

(1) Check whether there are foreign matters or not inside the VTR.

(2) Check whether the cylinder and the guides for tape transport system are contaminated.

1-4-2. Motor Sensor System Check

Check whether some abnormalities are found in the motor or the sensor system (including control circuits) according to the flow chart.

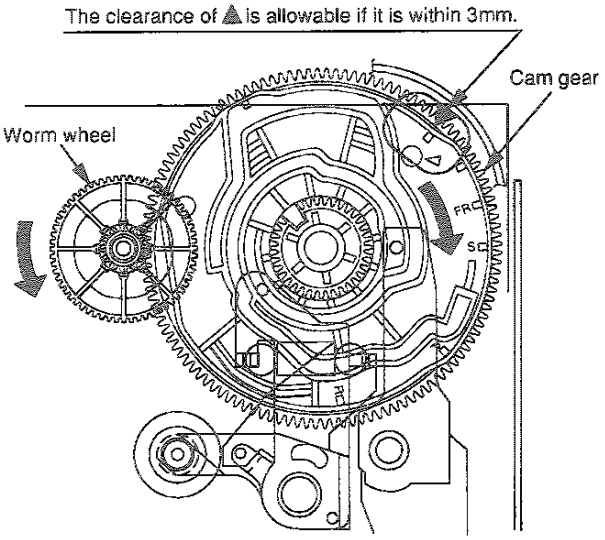
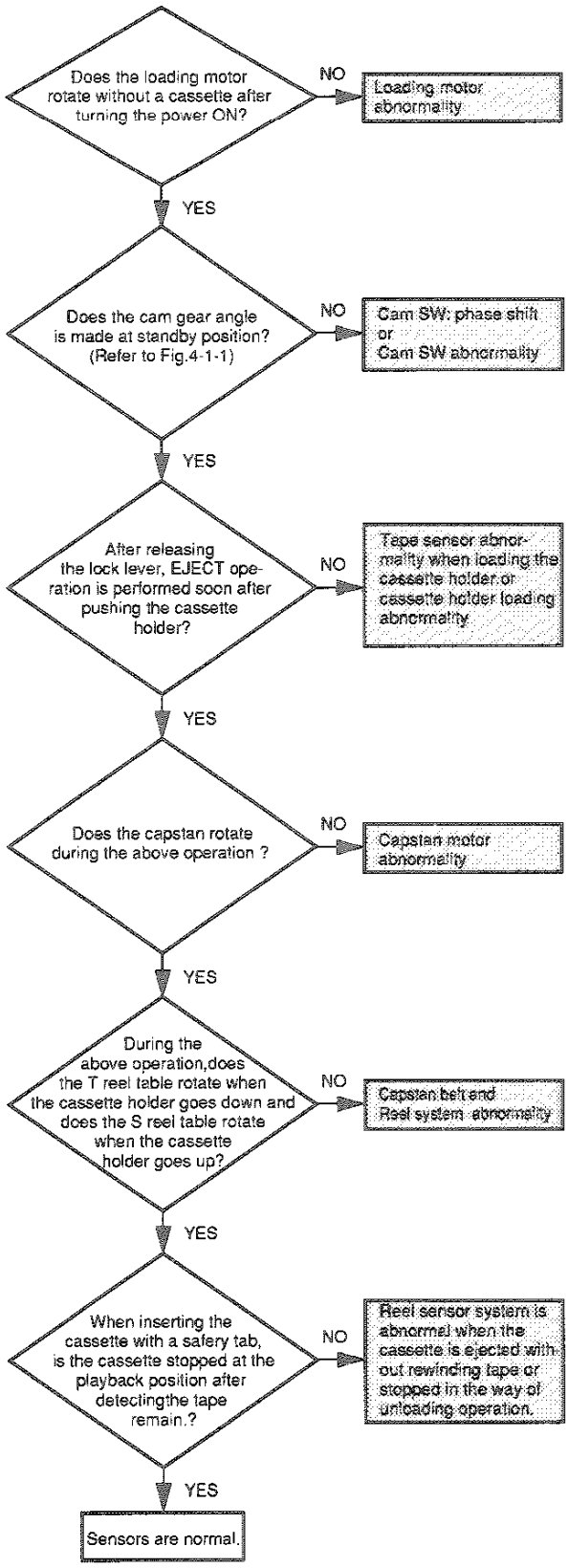


Fig. 4-1-1


Does the loading motor rotate without a cassette after turning the power ON?
NO
Loading motor abnormality
YES
Does the cam gear angle is made at standby position? (Refer to Fig.4-1-1)
NO
Cam SW: phase shift or Cam SW abnormality
YES
After releasing the lock lever, EJECT operation is performed soon after pushing the cassette holder?
NO
Tape sensor abnormality when loading the cassette holder or cassette holder loading abnormality
YES
Does the capstan rotate during the above operation ?
NO
Capstan motor abnormality
YES
During the above operation,does the T reel table rotate when the cassette holder goes down and does the S reel table rotate when the cassette holder goes up?
NO
Capstan belt and Reel system abnormality
YES
When inserting the cassette with a safery tab, is the cassette stopped at the playback position after detectingthe tape remain.?
NO
Reel sensor system is abnormal when the cassette is ejected without rewinding tape or stopped in the way of unloading operation.
YES
Sensors are normal.

1-4-3. Abnormality Analysis by Self-check Function

The unit used V3 mechanism has a self-check function. The self-check function works as a system which stored some abnormal condition. So, use this function to try to analyze the cause(s).

For the data display method and the content of the data, refer to the self-check function (described on page 2-48) in item 2-2.

Note:

- Abnormal data is displayed only when the first abnormal condition occurs, and is not displayed in the second time. Accordingly, the claim from customers and the actual data displayed may be different.
- The data is stored only when the power turns off after occurring the abnormality condition(s). The data is not stored when the unit operation is recovered by the microcomputer.
- After repairing, initialize the data by pressing the [COUNTER RESET] button while displaying the abnormal mode.

The typical examples in abnormal condition are shown below.

Table 4-3-1

A	B	C	Abnormal Condition	Check Item
06	01	09	Cylinder is stopped at playback position during playback the tape.	Check the cylinder motor. Check if the cylinder and tape transport guide are clogged.
02	01	0d	Cylinder is stopped at FF/REW position during rewind the tape.	
06	02	09	T reel sensor is abnormal at playback postion during playback the tape.	Check the capstan motor. Refer to the cases 2 and 3 describe on the table "Defective analyzing list".
03	03	07	S reel sensor is abnormal at playback position during REVIEW the tape.	
01	04	02	Cassette-in and out operation cannot be performed.	Refer to the case 1 described on the table "Defective analyzing list".
03	05	08	Mode shift cannot be performed during shifting to REVIEW.	

A: System control mode, B: Abnormality No., C: Mechanical position when an abnormality occurs.

1-4-4. Check by Defective Analyzing List

If the abnormality causes the mechanism abnormal condition, presume, confirm and treat the defective according to the "Defective analyzing list" in table 4-4-1.

(1) Manual mechanism operation (mode shift) method

Push in the lock lever R and L manually and turn the worm wheel counterclockwise as shown in Fig. 4-1-1. The cam gear is turned clockwise and the mode shifts to the direction where the loading operation can be performed. So, check the mechanism condition in the defective mechanism position when the abnormality occurs.

(2) Defective parts replacement

When a defective occurs due to the defective part(s) and the part(s) is replaced, take care the following items.

- Especially as for the mechanical parts requiring the phase alignment, take care of the part replacement **E.g.**. Assembling mode, phase alignment mark and etc.
- As for the part(s) requiring lubricant such as a specified amount of oil or grease, apply grease or oil according to the instructions and do not stick grease or oil to the portions without allowing to stick it (especially in removal and assembly).

(3) Check after treating the defective

After replacing a defective part and/or aligning a part, first check the mechanism operation manually and confirm that no problem occurs, and then mount the mechanical deck, turn the power ON and check the mechanism operation.

Note:

- After replacing the defective parts according to the procedure of the treatment method for the "damage and phase shift of mechanical part", check the operation of the mechanism again, since the same (or similar) defective problem may occur due to other serious cause (in mechanism or electrical circuit) when performing the actual total check with turning the power on.

Table 4-4-1 Defective Analyzing List

Case	Defective Phenomenon (Main Items)	Presumed Cause (Main Cause)	Check Method
1	Power does not turn on. Loading operation is defective. Mode shift operation is defective.	<General> Mechanical stops due to mechanical phase unmatching.	Check mode shift "Cassette out FF/REW position" can be performed when turning worm wheel.
	Loading operation is not performed.	Loading motor does not rotate. (Loading motor is defective or circuit is defective.)	Check loading motor whether it turns by the outer power supply (12.5V).
	Unloading operation is not performed.	S reel does not wind the tape.	Refer to case 3 in this table.
2	Playback operation is not performed. Playback operation is defective.	<General> Main brake is not released. (ON) T soft brake is not released. (ON) Idoler does not swing. Pinch does not press.	Check mechanical position.
		Capstan motor does not rotate. (Capstan motor is defective or circuit is defective.)	Check capstan motor.
	Playback picture does not appear. Video recording can not be performed.	<In case of no mechanical problem> Cylinder is defective. (Circuit is defective.)	Check cylinder assembly.
3	Playback interruption. Detective phenomenon during playback. Recording interruption.	Reel rotation detection is defective. (Sensor is defective. Circuit is defective.)	Check sensor output.
		Idler does not swing.	Check mechanical position.
		Reel belt is removed.	Check the reel belt is removed or not.
4	FF operation is not performed. FF operation is defective. REW operation is not performed. REW operation is defective. Others: REV/FF is not performed. Others: REV/FF is defective.	Main brake is not released. (ON) T soft brake is not released. (ON) Idler does not swing. Pinch is not released.	Check mechanical position.
		Capstan motor does not rotate. (Capstan motor is defective or circuit is defective.)	Check capstan motor.
5	REVIEW is not performed.	Main brake is not released. (ON) T soft brake is not actuated . Idler does not turn. Pinch does not press.	Check mechanical position.
		Capstan motor does not rotate. (Capstan motor is defective or circuit is defective.)	Check capstan motor.
6	Slot-in is not performed. Cassette can not be inserted.	<General> When the F/L is mounted on the mechanical deck,the position is not correct.	Check mechanical position.
7	Capstan servo does not work. Capstan servo is uneven. Tape speed is fast. Tape speed is slow. Tape speed is uneven. FG pulse is not output.	Capstan motor is defective.	Check capstan motor.
		ACE head control output is defective. (Circuit is defective.)	Check ACE head. Check CTL output.
8	Audio output does not come out. Audio output is small. Audio output variation is large. Audio output is uneven. Audio distortion. Audio noise. Others. Audio is defective.	ACE head is defective.	Check ACE head. Check CTL output.
		Tape transport adjustment is not defective.	Perform tape transport adjustment again after confirming tape transport condition.
		Hi-Fi head (cylinder) is defective. (Circuit is defective.)	Check cylinder. Check whether B+14V is supplied.

Treatment: If the mechanical is found out to be defective according to the procedures described above, perform the following treatment.
- •Misassembling, mechanical phase mismatch .....Repair correctly.
- •Parts defect, parts damage.....Replace parts.

If the mechanical is found out not to be defective according to the procedures above, check the circuit(s).

1-5. Mechanical Deck Removal and Mounting

1-5-1. Mechanical Deck Removal

1. Remove three screws (2) mounting the top cover (1) and remove the top cover sliding backward and lifting upward.
2. Remove two screws (3) and remove the front panel (4).
3. Remove the FFC (8) connecting the main unit (5) and the KDB1 unit (6) & the Sub Main unit (7).

Note:

Be sure to remove the FFC (8) on the KDB1 unit (6) and the Sub Main unit (7) sides.

4. Remove three screws (10) securing the mechanical deck (9) and one screw (12) securing the terminal board (11).
5. Remove the claw securing the main unit (5).
6. Remove the mechanical deck (9) with the main unit (5) from the chassis lifting the terminal board (11) slightly and pulling the top bracket (13) upward.

Note:

When pulling the top bracket upward, take care not to deform the reinforcement plate located below the F/L assembly.

7. Remove the lead wire connecting between the mechanical deck (9) and the main unit (5).
8. Turn over the mechanical deck (9).
9. Remove the reel belt (14) and one screw (15).
10. Remove four claws securing the mechanical deck (9) and the main unit (5), and then remove the main unit (5) pulling upward.

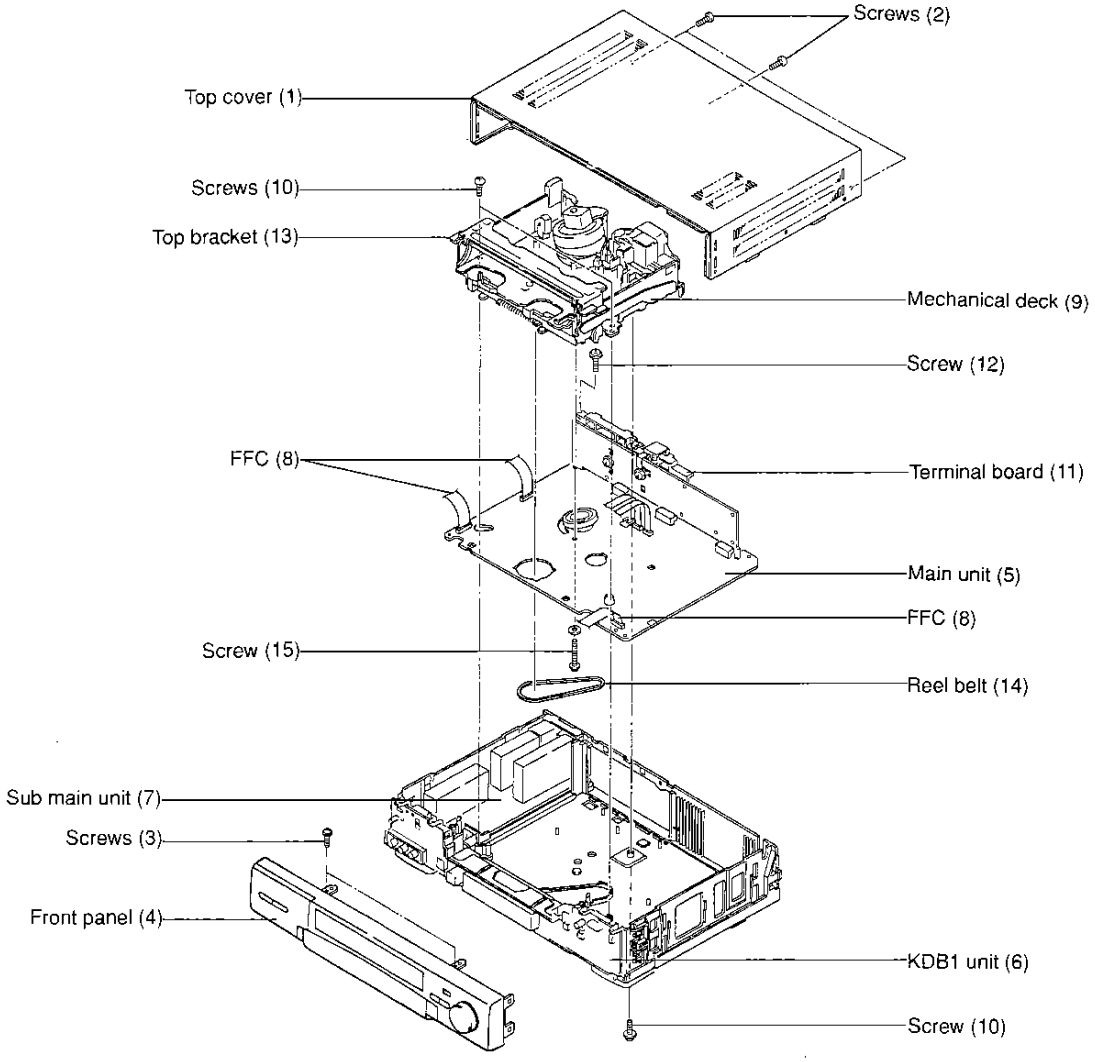


Fig. 5-1-1

1-5-2. Mechanical Deck Mounting

1. Turn over the mechanical deck and lower the main unit vertically adjusting the tape end sensor and etc. to the holes.

Note:

- Adjust the rotor of the cylinder motor and the stator of the main unit, and then lower the main unit further more till four claws catch the mechanical deck completely.
- Take care not to damage the rotor and the stator.
- When locking the claw of the front right side to the main unit, turn the REC inhibit lever so as not to damage the switch.

2. Mount the mechanical deck on the chassis in reverse order of removal.

Note:

When mounting the front panel, mount it with its door fully open.

1-5-3. Confirmation of Each Operation Mode without Cassette

1. Shut out the light to the start/end sensor.
2. Release the both sides of the lock lever and make a slot-in condition.
3. Turn the reel table manually located on the opposite side of the rotating reel table.
4. In this condition, confirmation of each operation mode can be performed.

Note:

When turning the opposite side reel table of the rotating reel table manually in playback, FF/REW mode, and sending no reel pulse, the auto eject or power off function is performed.

1-6. Main Parts Replacement

1-6-1. Top Bracket Replacement

1. Remove two securing screws (2) on the top bracket (1).
2. Remove the top bracket (1) lifting in the direction shown by the arrow.

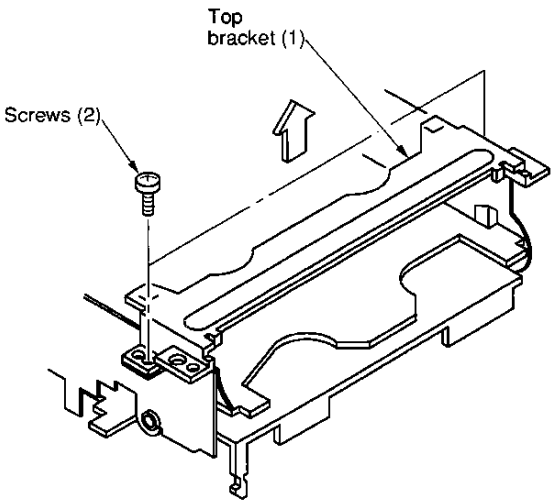


Fig. 6-1-1

3. When mounting the top bracket (1), move the tip of the grip lever (3) on the cassette holder assembly to the inclined portion of a trapezoidal cam, and then mount the top bracket (1).

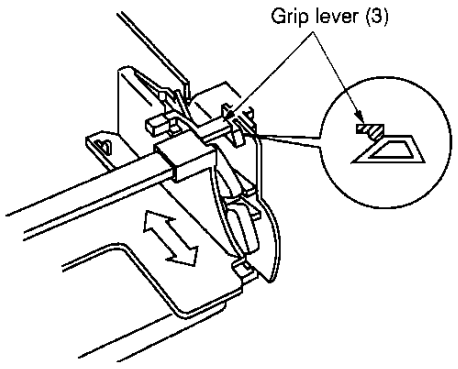


Fig. 6-1-2

Note:

- After remounting the top bracket (1), move the cassette holder forward and backward, and then confirm the claws of the lock lever (5) catch completely the both left and right sides of the stopper section (4) at the top bracket (1).

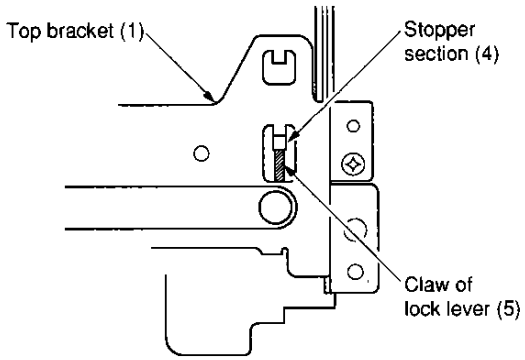


Fig. 6-1-3

1-6-2. Cassette Holder Assembly Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. The cassette holder assembly (1) is guided along the guide grooves (2) with both left and right bosses of the cassette holder assembly (1). So first remove each side boss (3) on both left and right sides of cassette holder assembly (1) from the guide groove (2).
3. When the cassette holder assembly (1) is set at the EJECT position, the boss is located at (a), so move the boss from (a) to (b) and remove the bosses on both left and right sides simultaneously.

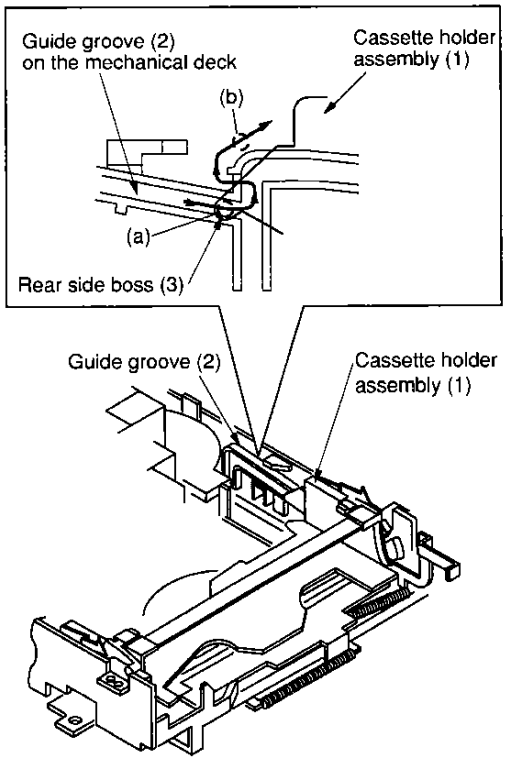


Fig. 6-2-1

Note:

The grip lever (4) on the cassette holder assembly (1) may catch the trapezoidal cam on the mechanical deck (2), so perform the work lifting the grip lever in the direction shown by the arrow.

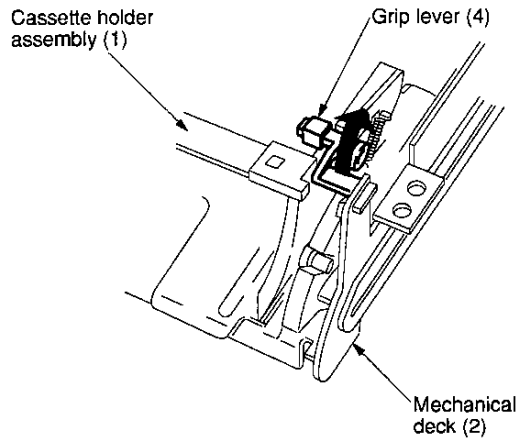


Fig. 6-2-2

4. After removing the front side bosses (5) on both left and right sides, remove the cassette holder assembly (1) pulling to the front side.
5. When mounting the cassette holder assembly (1), insert the front side bosses (5) to the U shaped groove of the drive arm (6) and the guide groove (2) on the mechanical deck lifting the rear side of the cassette holder assembly (1).

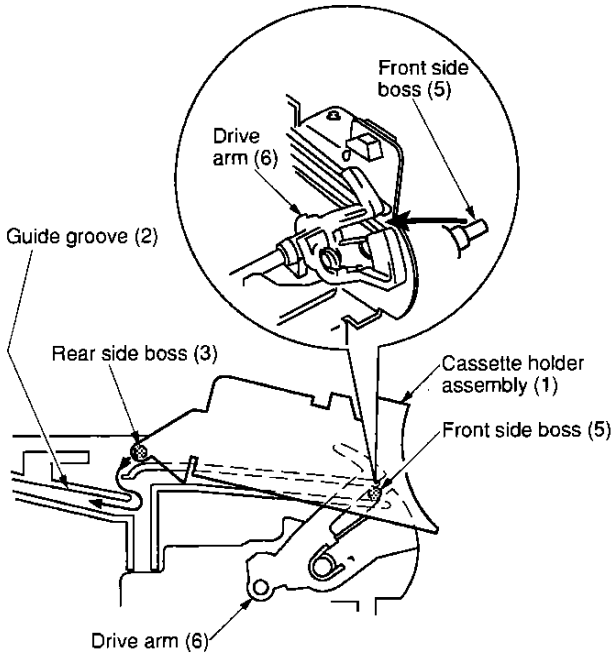


Fig. 6-2-3

6. When mounting the rear side bosses (3), perform the reverse order of removal.

1-6-3. Door Open Lever Replacement

1. Release the lock lever (2) on the cassette holder assembly (1) pressing in the direction shown by the arrow.

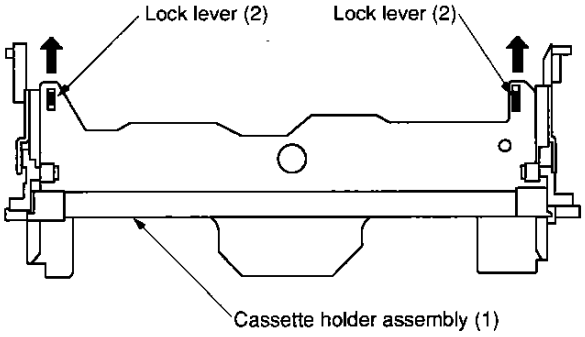


Fig. 6-3-1

2. Move the cassette holder assembly (1) slightly to the rear side.
3. Remove the claws (A) and (B) on the door open lever (3) from the mechanical deck (4).
4. Match the boss on a new door open lever (3) and the hole (C) on the mechanical deck, and then insert the claws (B) first and then (A) to the mechanical deck (4).

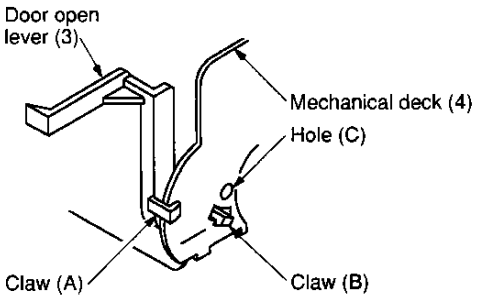


Fig. 6-3-2

5. Remount the cassette holder assembly to the position as it was.

1-6-4. Drive Lever Gear Replacement

1. Make the cassette holder assembly to the slot-out (EJECT) position.

Note:

- In this condition, both mark holes on the F/L drive slider (1) and the mechanical deck fit with each other, also the hole of the boss on the drive lever gear (2), the center of the gear tooth and the marking line are in line.

2. Move the claw of the drive arm (3) to the direction of the arrow (A) and remove the drive lever gear (2) upward.

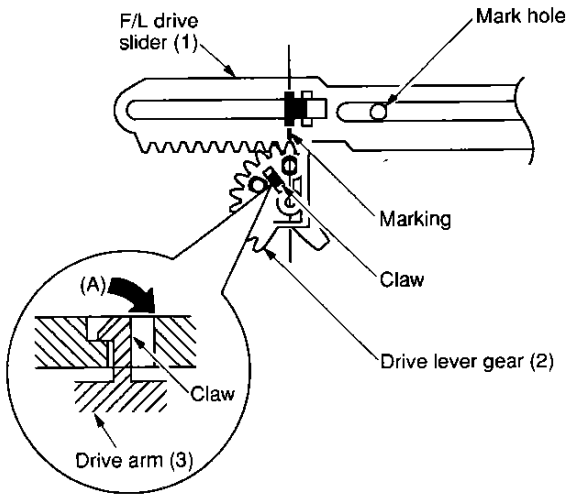


Fig. 6-4-1

3. When remounting the drive lever gear (2), take care of the phase position (refer to the note described above.) and mount in the reverse order of removal.

1-6-5. Drive Arm Assembly Replacement

1. Remove the top bracket assembly. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the door open lever. (Refer to item "1-6-3. Door Open Lever Replacement.")
4. Remove the drive lever gear. (Refer to item "1-6-4. Drive Lever Gear Replacement".)
5. Pull the REC-inhibiting lever slightly to the front side, turn the drive arm assembly (1) to the front side and push it in the direction shown by the arrow. Remove the left side boss (2) on the drive arm assembly (1) from the cutout of the guide groove on the mechanical deck (3).
6. Remount the drive arm assembly (1) in the reverse order of removal.

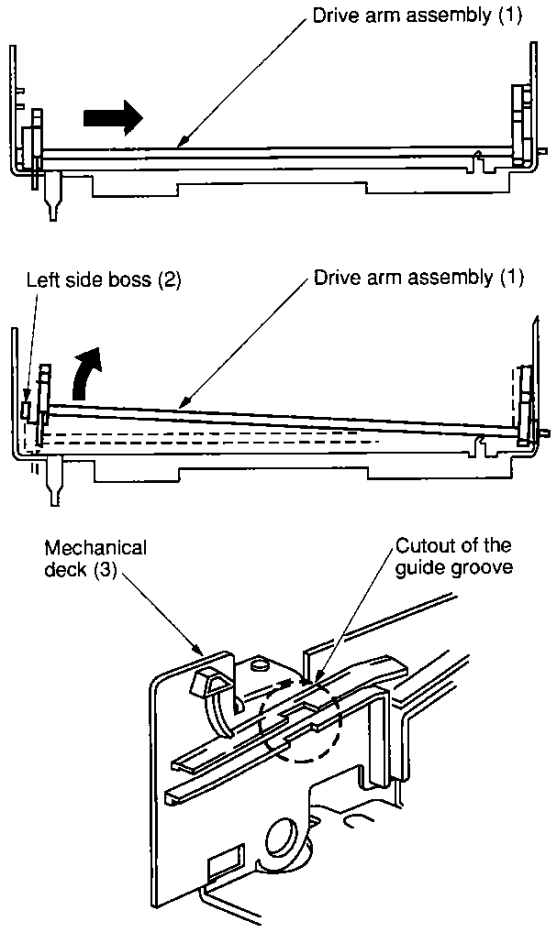


Fig. 6-5-1

1-6-6. Cam Lever Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the cam slider. (Refer to item "1-6-41. Cam Slider Replacement".)
4. Remove the loading drive assembly. (Refer to item "1-6-29. Loading Drive Assembly Replacement".)
5. Remove the drive lever. (Refer to item "1-6-40. Drive Lever Replacement".)
6. Remove the pinch roller assembly. (Refer to item "1-6-21. Pinch Roller Assembly Replacement".)
7. Remove the cam gear. (Refer to item "1-6-31. Cam Gear Replacement".)
8. Move the cam lever (1) until it stops in the direction shown by the arrow (A). Pull out the cam lever (1) lifting up straightly at the position where the cam lever (1) stops.
9. Apply grease to the portions of bosses (A) to (C) on a new cam lever.

Note:

- Confirm that the boss (A) on the cam lever (1) is inserted into the hole on the F/L drive slider (2).
- After inserting the cam lever (1), confirm that the cam lever (1) moves smoothly.

10. Replace the cam lever in the reverse order of removal.

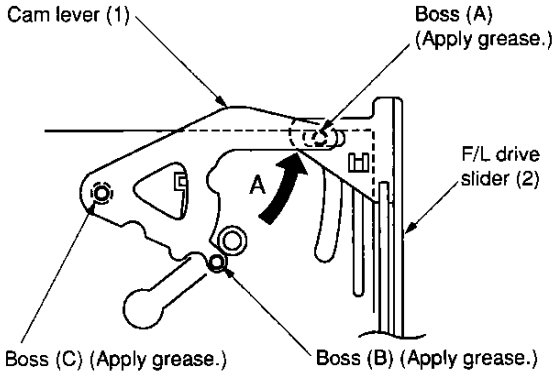


Fig. 6-6-1

1-6-7. F/L Drive Slider Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the cam slider. (Refer to item "1-6-41. Cam Slider Replacement".)
4. Remove the loading drive assembly. (Refer to item "1-6-29. Loading Drive Assembly Replacement".)
5. Remove the drive lever. (Refer to item "1-6-40. Drive Lever Replacement".)
6. Remove the pinch roller assembly. (Refer to item "1-6-21. Pinch Roller Assembly Replacement".)
7. Remove the cam gear. (Refer to item "1-6-31. Cam Gear Replacement".)
8. Remove the cam lever. (Refer to item "1-6-6. Cam Lever Replacement".)
9. Remove the drive lever gear. (Refer to item "1-6-4. Drive Lever Gear Replacement".)
10. Push the F/L drive slider (1) in the direction shown by the arrow (A) and slide it. Furthermore, pull out it to the front side lifting it in the direction shown by the arrow (B).
11. Apply grease to the shaded parts (a) to (d) on a new F/L drive slider (1).

Note:

For the phase alignment of the drive lever gear, refer to item "1-6-4. Drive Lever Gear Replacement".

12. Replace the F/L drive slider (1) in the reverse order of removal.

Note:

After completion of the replacement, confirm that the F/L drive slider (1) moves smoothly.

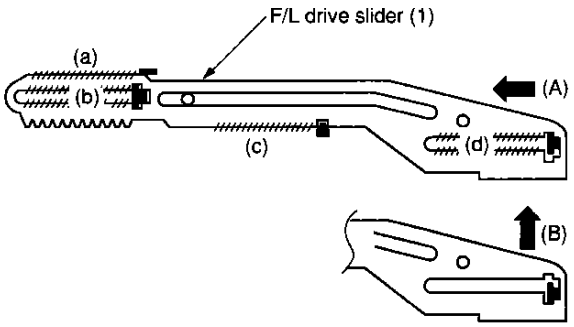


Fig. 6-7-1

1-6-8. Arm Brake Lever Assembly and Arm Brake Torsion Spring Replacement

1. Make the cassette holder assembly to the slot-out (EJECT) position.
2. Turn the arm brake lever assembly (1) in the direction shown by the arrow (A) until it stops. Pull out the arm brake lever assembly (1) to the front at the position it stops.

Note:

Take care that the arm brake torsion spring (2) is removed forcefully.

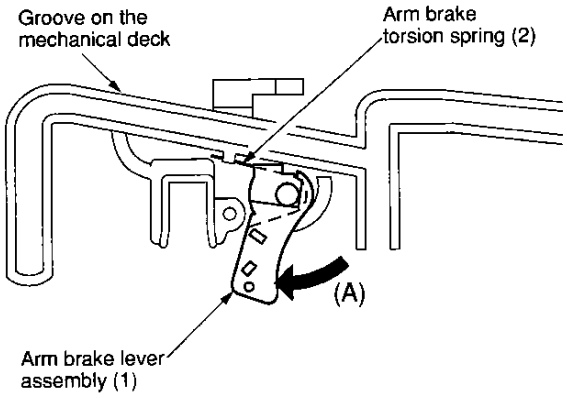


Fig. 6-8-1

3. Hook the arm brake torsion spring (2) temporarily to a new arm brake lever assembly (1).

Note:

Take care of the direction of the arm brake torsion spring (2) so that the longer end of the arm brake torsion spring (2) is hooked on the temporary hook.

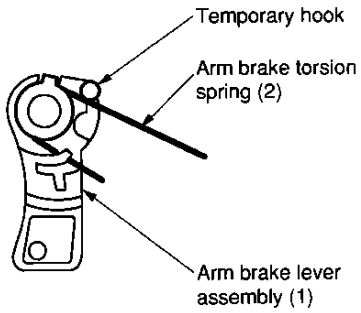


Fig. 6-8-2

4. Insert the hook portion on the arm brake lever assembly (1) to the cutout on the mechanical deck.
5. Turn the arm brake lever assembly (1) counterclockwise and fix it at the position which the arm brake lever assembly (1) faces to the straight below.
6. When pushing the tip of the arm brake torsion spring (2) located at (B) position, the tip is removed from the temporary hook and moves to the hook on the mechanical deck.
7. The arm brake lever assembly turns to the specified position by force of the arm brake torsion spring.

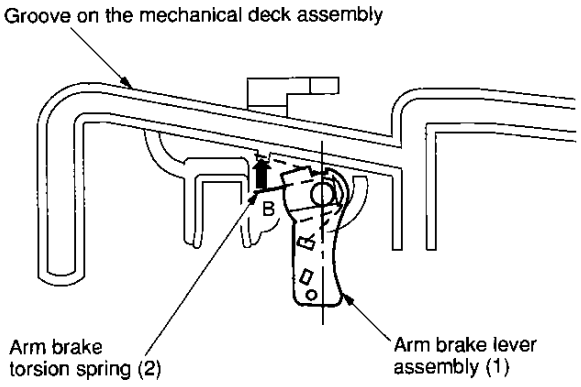


Fig. 6-8-3

1-6-9. Cylinder Assembly Inspection and Replacement

<Inspection>

1. Check if the tape transport surface on the lower cylinder assembly are not damaged.
2. Check if the rotation of the upper cylinder assembly is not abnormal.

When any abnormality is found according to the inspection procedures described above 1 and 2, replace the cylinder assembly.

<Replacement>

1. Remove the slip ring assembly. (Refer to item "1-6-13. Slip Ring Assembly Replacement".)
2. Remove the head cleaner. (Refer to item "1-6-14. Head Cleaner Replacement.")
3. Remove the FPC (1) on the rotary transformer.
4. Remove three screws (2) and the cylinder holding plate (3) and (4). (Refer to item "1-6-12. Cylinder Holding Plate Replacement".)
5. Remove the cylinder assembly (5).
6. Remount the cylinder assembly (5) in the reverse order of removal. Fix the cylinder pressing slightly in the direction shown by the arrow A and the cylinder holding plate (3) pressing slightly in the direction shown by the arrow (B). (Tightening torque: 294 – 392 mN•m (3 – 4 kg•cm))

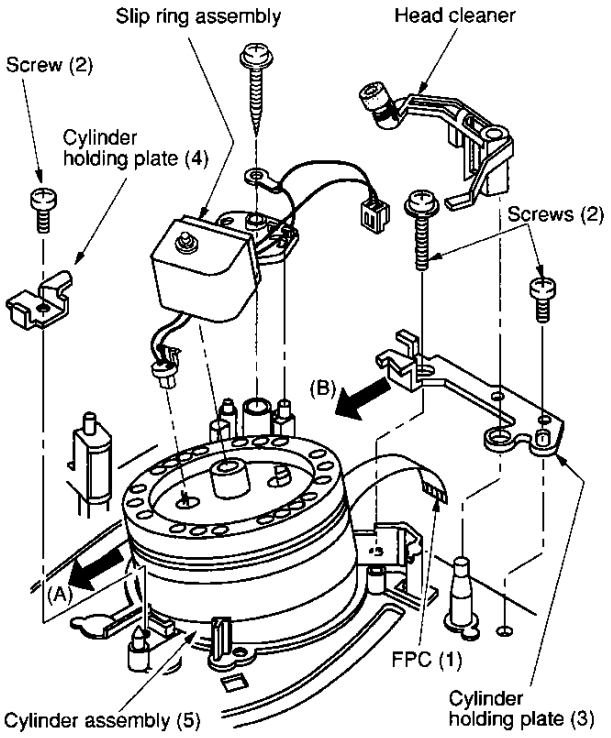


Fig. 6-9-1

Note:

- When remounting the cylinder holding plate (3), after confirming that the FPC (1) is hooked at the groove on the lower cylinder assembly properly, and then insert the FPC under the tip of the cylinder holding plate (3).
- When replacing, take much care not to touch the video head directly and damage the cylinder.

7. Perform the tape transport adjustment.

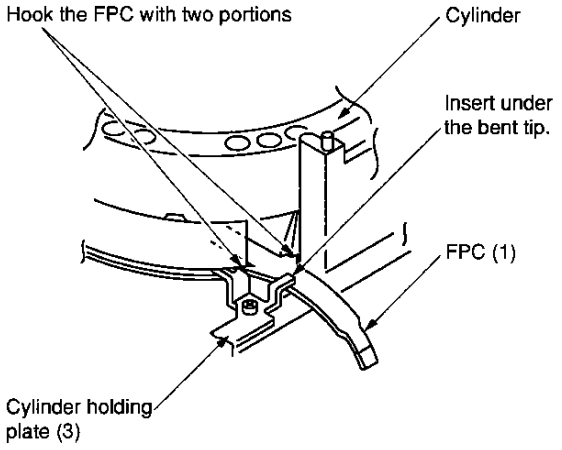


Fig. 6-9-2

1-6-10. Upper Cylinder Assembly & Pre Amplifier Inspection and Replacement

<Inspection>

1. Check if the video heads are damaged or worn out.
2. Check the video heads for clogging. (In case that the clogging is not remedied after cleaning.)

<Replacement>

1. Remove the slip ring assembly. (Refer to item "1-6-13. Slip Ring Assembly Replacement".)
2. Remove two securing screws (1) and remove the upper cylinder assembly (2).
3. Remove four securing screws (3) and remove the pre amplifier assembly (4) and the ring (5).

4. 1)

If any abnormality is found on the video head, replace the upper cylinder sub assembly (6) and fix the pre amplifier (4) with two screws. (Tightening torque: 392 – 441 mN•m (4 – 4.5 kg•cm))

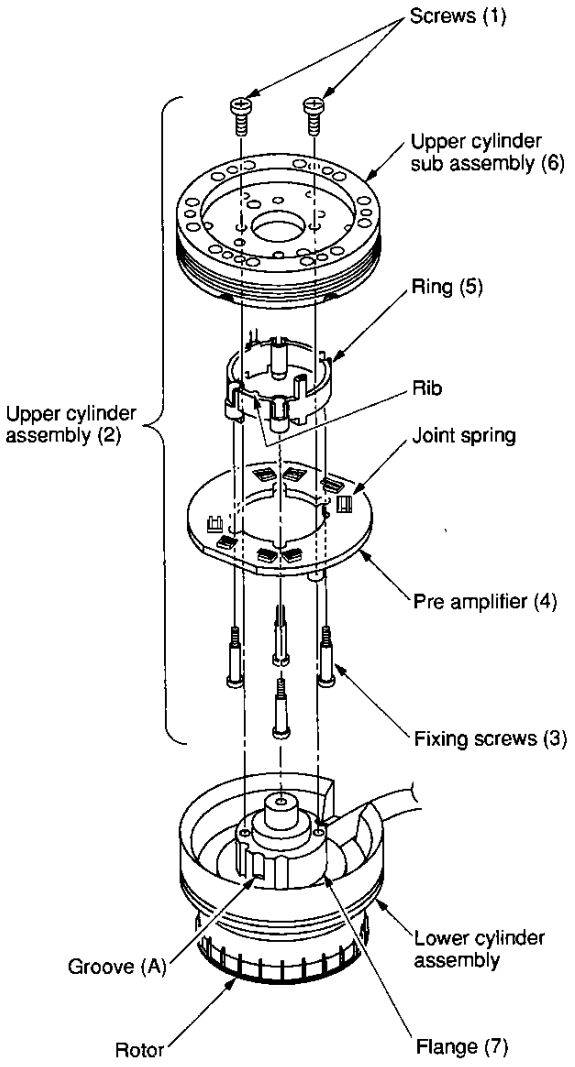


Fig. 6-10-1

2)

If any abnormality is found on the pre-amplifier (4), replace the pre-amplifier (4).

After desoldering, remove the ring (5) and mount the pre-amplifier (4) to the upper cylinder sub assembly (6). Solder the pre-amplifier (4) after fixing with four screws (3).

(Tightening torque: 392 – 441 mN•m (4 – 4.5 kg•cm))

Note:

Adjust each phase of the head (8), rib and marking ▲ on the upper cylinder sub assembly (6), ring (5) and the pre amplifier (4).

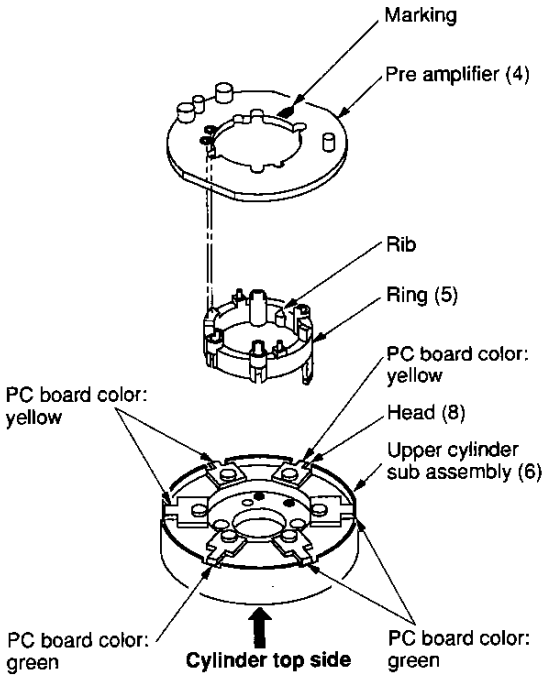


Fig. 6-10-2

5. Clean the upper cylinder sub assembly (6) and the mounting surface of the flange (7) with a cleaning kit.
6. Mount the upper cylinder assembly (2) so that the rib of the upper cylinder (2) (ring (5)) matches with groove (A) on the flange (7), then fix them with two screws (1). (Tightening torque: 294 – 392 mN•m (3 – 4 kg•cm))

Note:

- Mount the FPC so that the FPC is inserted into the cutout of the lower cylinder assembly.
- During the work in steps 2 to 6, take care not to touch the joint spring on the pre amplifier and deform it.

7. Perform the tape transport adjustment according to its procedures.

1-6-11. Lower Cylinder Assembly Inspection and Replacement

<Inspection>

1. Check if the tape transport surface on the lower cylinder assembly is not damaged.
2. Check if the rotation of the upper cylinder assembly is not abnormal.
3. Check if the FPC on the rotary trans is not damaged.

When any abnormality is found under the inspection described in the steps (1) to (3), replace the cylinder assembly.

<Replacement>

1. Remove the cylinder assembly. (Refer to item "1-6-9. Cylinder Assembly Inspection and Replacement".)
2. Remove two securing screws (1) and remove the upper cylinder assembly (2).
3. Replace the lower cylinder assembly (3).
4. Mount the lower cylinder assembly in the reverse order of removal taking care not to touch the video head directly and damage the cylinder.

Note:

- Take care not to deform the joint spring on the upper cylinder assembly (2).
- Refer to item "1-6-9. Cylinder Inspection and Replacement" for the treatment of the FPC.

5. Perform the tape transport adjustment according to its procedures.

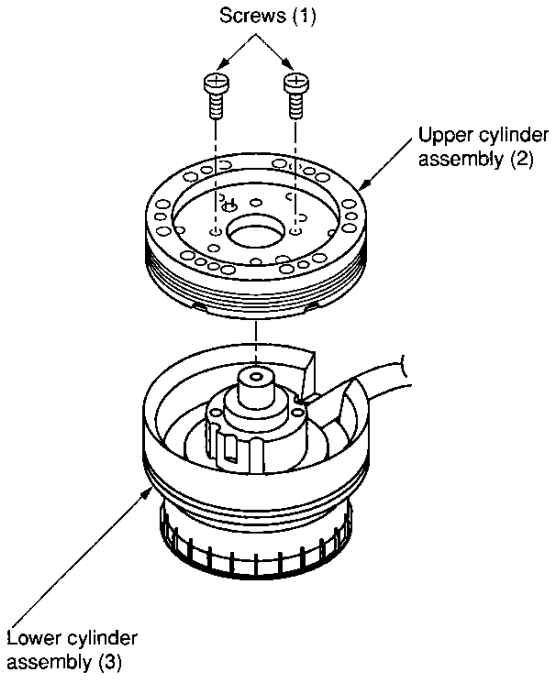


Fig. 6-11-1

1-6-12. Cylinder Holding Plate Replacement

1. Remove screws (1) and (2) securing the cylinder holding plate (3) and a screw (5) securing the cylinder holding plate (4).
2. Remove the cylinder holding plate (3) and (4) sliding in the direction shown by the arrow (B) and (A).
3. Eliminate the cylinder lock key (wedge shaped parts).
4. After replacing the cylinder holding plates (3) and (4), mount new parts in the reverse order of removal.

Note:

- When remounting, fix the cylinder while pushing in the direction shown by the arrow (A) and the cylinder holding plate (3) in the direction shown by the arrow (B). Then tighten three screws while pushing the cylinder holding plate (4) toward the stopper on the outsert of the mechanical deck.
- Take care of the position inserting the FPC. (Refer to item "1-6-9. Cylinder Assembly Inspection and Replacement".)
- Tightening order of the screws is (1) → (2) → (5).
- Tightening torque of the screws (1), (2), (5) is 294 – 392 mN•m (3 – 4 kg•cm).
- Take care of the position inserting the FPC when mounting the cylinder holding plate (3). (Refer to item "1-6-9. Cylinder Assembly Inspection and Replacement".)

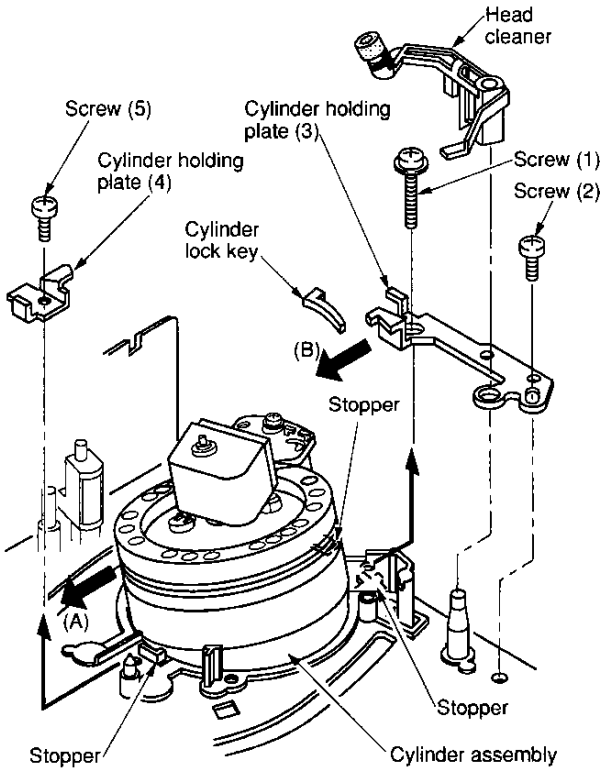


Fig. 6-12-1

1-6-13. Slip Ring Assembly Replacement

1. Remove two connectors (2) (cylinder side and PC board side) of the slip ring assembly (1).
2. Remove a screw (3).
3. Remove the slip ring assembly (1) upward.
4. After replacing the slip ring assembly (1), mount it in the reverse order of removal.

Note:

- Take care of the connector (2) direction. (The wire holder portion of the cylinder side connector (2) faces to the center pole of the cylinder.)
- Take care not to add force to the upper cylinder assembly.
- Take care not to deform the spring plate on the slip ring assembly, because it is easily deformed.
- After replacing, confirm no slack is found on the connector lead wire on the PC board side. (If any slack is found, remove the slack.)
- When securing the screw (3), be sure to secure the rag terminal together.
- When mounting the slip ring assembly (1), first insert the shaft into the center hole of the coupling.
- When mounting and removing the cylinder side connector, use tweezers.

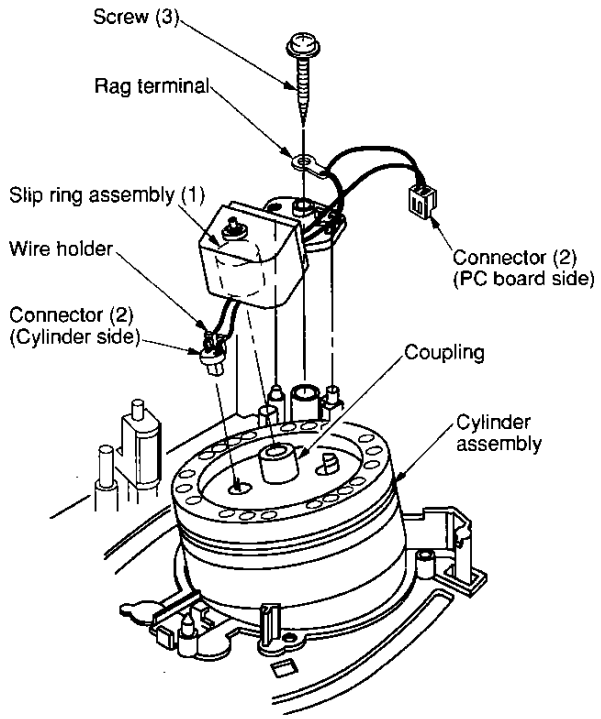


Fig. 6-13-1

1-6-14. Head Cleaner Replacement

<Roller sub assembly replacement>

1. Remove the roller sub cleaner assembly (2) pulling upward from the hook (A) on the cleaner lever (1).
2. After replacing the roller sub assembly, mount in the reverse order of removal.

<Cleaner lever replacement>

1. Undo the hook (B) of the cleaner lever (1) from the mechanical deck, and pull out the cleaner lever (1) upward.
2. Replace the cleaner lever (1) on the roller sub assembly (2), and mount the cleaner lever (1) in the reverse order of removal.

Note:

- Take care the roller sub assembly (2) is not stained with grease or oil.

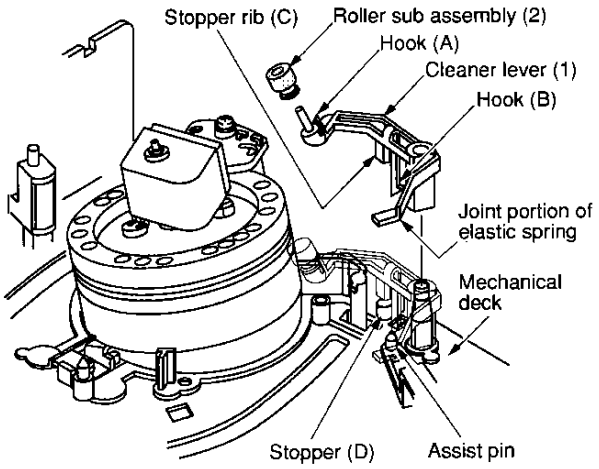


Fig. 6-14-1

Note:

- When remounting the head cleaner, position the stopper rib (C) in front of the stopper (D).

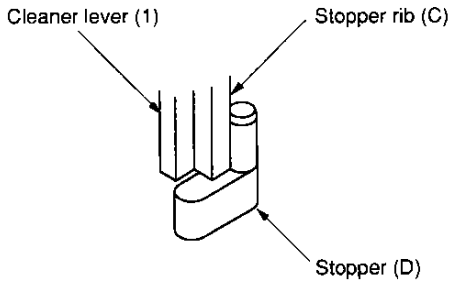


Fig. 6-14-2

Note:

- Confirm that the joint portion (E) of the elastic spring positions in front of the assist pin (F) on the cleaner assist lever (4).

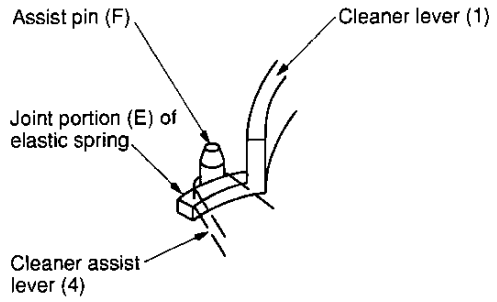


Fig. 6-14-3

1-6-15. No. 8, No. 3 Guide Sleeves Replacement

1. When replacing the No. 8 guide sleeve (1), first remove the guide cap (2) on the loading bracket assembly.
2. Pull out the guide sleeve (1) from the guide post (3).

Note:

- Take care not to break the No. 8, No. 3 guide posts on the mechanical deck if twisting the guide sleeve forcefully.

3. Insert a new guide sleeve (1) to the guide post.

Note:

- When inserting the guide sleeve (1), take care so that its hole faces the opposite side to the tape transport surface.

4. For No. 8 guide sleeve, insert the No. 8 guide cap (2) onto it.

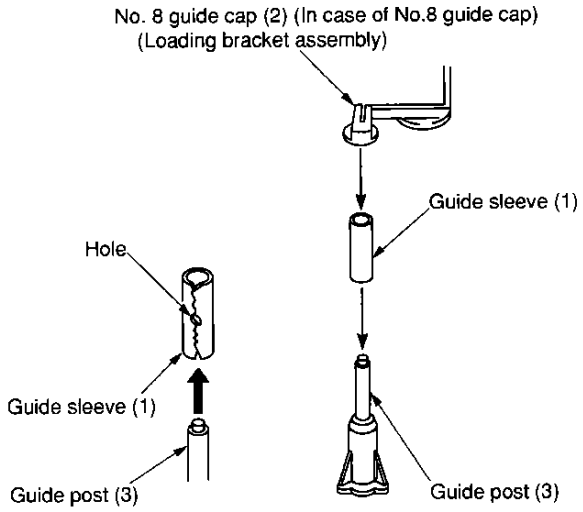


Fig. 6-15-1

1-6-16. ACE Head Assembly Replacement

1. Remove the FFC (1) from the connector.
2. Remove two screws (2) and remove the ACE main base (3) and ACE head assembly (4).
3. Remove three adjusting screws (5), (6), and (7) and then remove the ACE head assembly (4).

Note:

- When replacing ACE head (9) only without replacing its PC board, unsolder the ACE head (9) on the ACE head PC board (8) and then remove the ACE head (9) and the ACE head PC board (8).

4. Mount the ACE head assembly (4) in the reverse order of removal.

Note:

- When reassembling the ACE head assembly (4), First set the ACE springs (10) between the ACE head assembly (4) and the ACE main base (3), and secure the adjusting screws (5), (6), and (7).

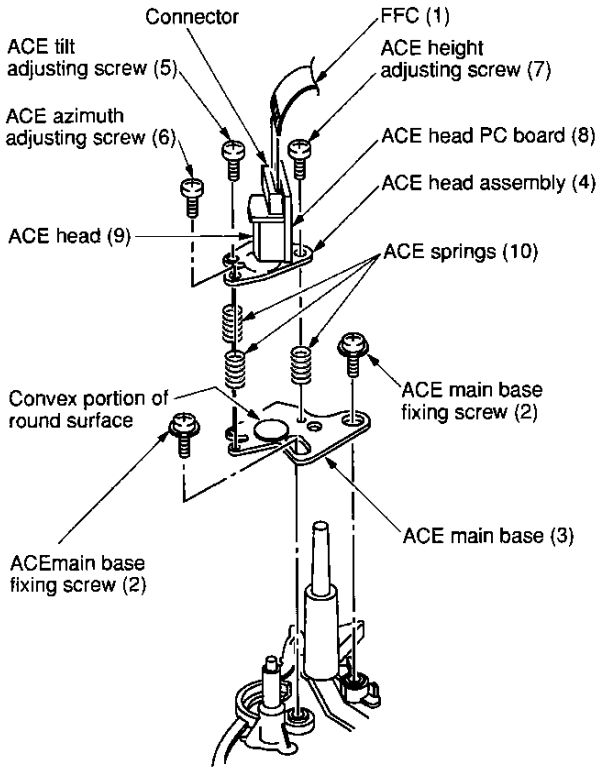

Connector
FFC (1)
ACE tilt adjusting screw (5)
ACE height adjusting screw (7)
ACE azimuth adjusting screw (6)
ACE head PC board (8)
ACE head assembly (4)
ACE head (9)
ACE springs (10)
Convex portion of round surface
ACE main base fixing screw (2)
ACE main base (3)
ACEmain base fixing screw (2)

Fig. 6-16-1

- When securing three adjusting screws, mount the ACE main base (3) and ACE head assembly (4) so that the clearance between them becomes parallel with the specified preset value (4.3 ± 0.1 mm).

5. After replacing, perform the tape transport adjustment.

Note:

- When replacing the ACE head assembly (4), always use an ACE head (9) having the same part number. Do not use any other ACE head assembly.

1-6-17. FE Head Replacement

1. Open the FE head holding hook (1) on the mechanical deck slightly in both left and right directions and remove the FE head (2) by moving in the direction shown by the arrows.
2. Replace the FE head (2) and mount the parts in the reverse order of removal.
3. Perform adjustment from the linearity adjustment item in the tape transport system adjustment.

Note:

- When mounting the FE head, Push the head backward completely.
- Though FE head (2) can be removed upward by opening the FE head holding hook (1) to both left and right directions, perform the standard replacement procedure described above since this may cause deformation of the hook.

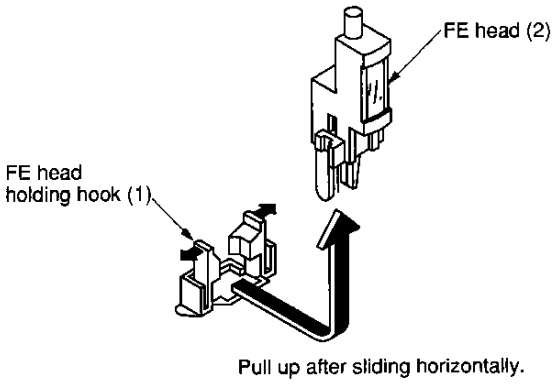


Fig. 6-17-1

1-6-18. S, T Slider Replacement

1. Remove the tension lever assembly. (Refer to item "1-6-23. Tension Lever Assembly Replacement".)
2. Remove the loading slider. (Refer to item "1-6-25. Loading Slider Replacement".)
3. Remove the S loading assembly. (Refer to item "1-6-24. S Loading Assembly Replacement".)
4. Remove the T loading assembly. (Refer to item "1-6-24. T Loading Assembly Replacement".)
5. Remove the S slider (1) and T slider (2) lifting up to the cutout of the groove on the mechanical deck (3).
6. Remove the S and T guide rollers and mount a new slider.
7. Mount the parts in the reverse order of removal.

Note:

Perform the phase alignment between the loading slider (4) and S, T loading assemblies (5), (6) referring each replacement procedure.

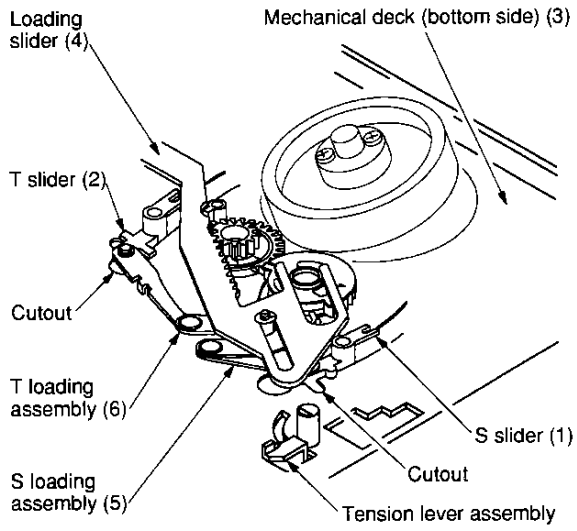


Fig. 6-18-1

8. After completion of the replacement, perform the adjustment from item 1 in the tape transport system adjustment.

1-6-19. S, T Guide Rollers Replacement

The same replacement procedures will be applied for the S, T guide rollers.

1. Turn the guide roller (1) counterclockwise and remove the guide roller (1) from the slider assembly (2).
2. Mount a new guide roller on the slider assembly (2) turning clockwise.
3. After completion of the replacement, perform the adjustment from the linearity adjustment in the tape transport system adjustment..

Note:

- O ring is not applied to the T guide roller.
- For the T guide roller, marking is located on the upper flange. So take care not to mis-mount with the S guide roller.

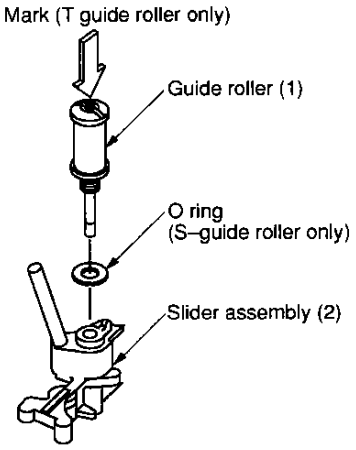


Fig. 6-19-1

1-6-20. S, T Impedance Roller Replacement

1. Remove two screws (1) and (2), and then remove two brackets (3), (4).
2. Replace two impedance rollers (5), (6).
3. Mount the parts in the reverse order of removal.
4. After completion of the replacement, perform the adjustment from the linearity adjustment in the tape transport system adjustment.

Note:

- S, T impedance rollers (5), (6) is not always applied to all models.

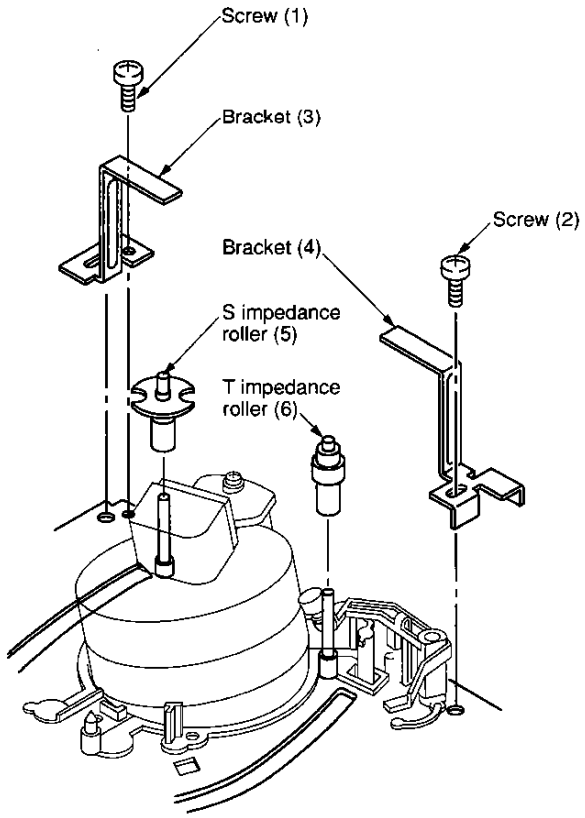


Fig. 6-20-1

1-6-21. Pinch Roller Assembly Replacement

1. Remove the loading drive assembly (Refer to item "1-6-29. Loading Drive Assembly Replacement".)
2. Remove the pinch assembly (1) lifting vertically from the pinch post (2).
3. Remove the pinch spring (5) from the hooks on the pinch drive assembly (3) and the pinch lever assembly (4).
4. Turn the projection (A) on the pinch drive assembly (3) counterclockwise till it goes to the cutout on the pinch lever assembly (4).
5. After replacing, mount the parts in the reverse order of removal.
6. After completion of the replacement, perform the tape transport adjustment.

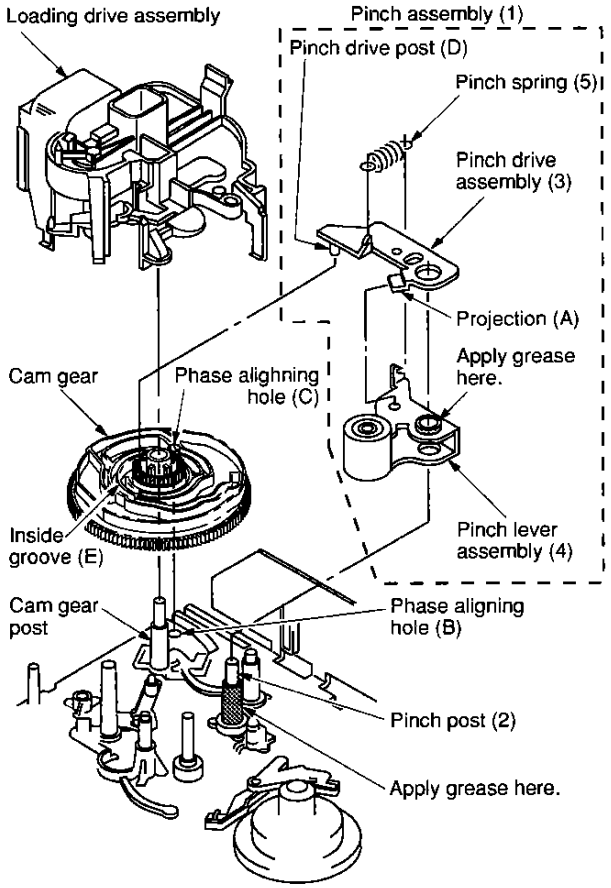


Fig. 6-21-1

Note:

- For the removal and assembling of the loading drive assembly, refer to item 1-6-29.
- When inserting the pinch assembly (1) into the pinch post (2), insert it so that the pinch drive post (D) enters the groove (E) inside the cam gear.
- Take care not to touch the surface of the pinch roller and the grease is not stained on it.
- Be sure to apply grease to the surface of the bar-ring on the pinch lever assembly (4) and the pinch post (2) on the mechanical deck.

1-6-22. No. 9 Guide Lever Assembly Replacement

1. Remove the loading drive assembly. (Refer to item "1-6-29. Loading Drive Assembly Replacement".)
2. Remove the drive lever. (Refer to item "1-6-40. Drive Lever Replacement".)
3. Remove the pinch assembly. (Refer to item "1-6-21. Pinch Roller Assembly Replacement".)
4. Remove the ACE head assembly. (Refer to item "1-6-16. ACE Head Assembly Replacement".)
5. Remove the cam gear (2) from the cam gear post (1).
6. Remove the T soft brake spring (3).
7. Remove the No. 9 guide lever assembly (4) lifting the No. 9 guide lever assembly upward from the No. 9 guide post (5).
8. After replacing, mount the parts in the reverse order of removal.
9. After completion of the replacement, perform the tape transport adjustment.

Note:

- When mounting the No. 9 guide lever assembly (4), confirm that (A) side of the No. 9 guide lever assembly (4) touches the capstan motor housing portion.
- After inserting the No. 9 guide lever assembly (4) into the No. 9 guide post (5), confirm that the lower projection of the No. 9 guide lever assembly (4) touches to the upper surface of the mechanical deck.
- Take care that the grease is not stained on the No. 9 guide post of the No. 9 guide lever assembly (4).
- Be sure to apply grease to the No. 9 guide post (5).

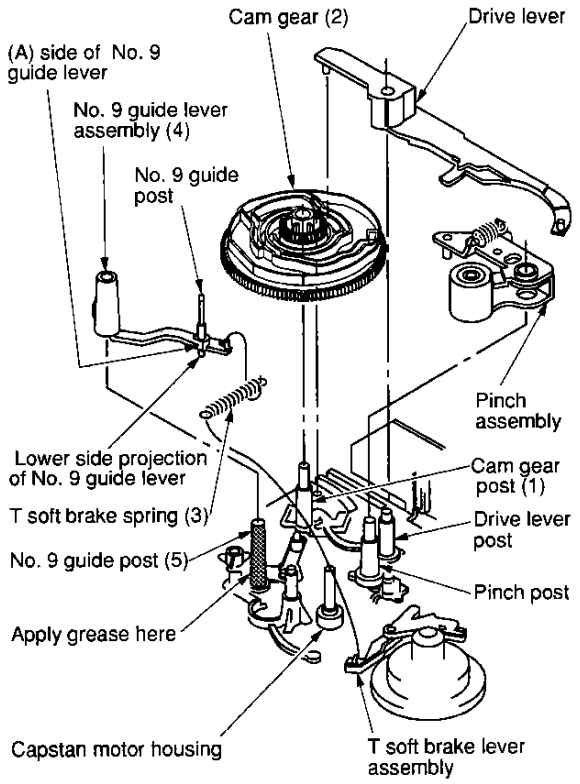

Cam gear (2)
Drive lever
(A) side of No. 9 guide lever
No. 9 guide lever assembly (4)
No. 9 guide post
Pinch assembly
Lower side projection of No. 9 guide lever
Cam gear post (1)
T soft brake spring (3)
Drive lever post
No. 9 guide post (5)
Pinch post
Apply grease here
Capstan motor housing
T soft brake lever assembly

Fig. 6-22-1

1-6-23. Tension Lever Assembly, Band Holder and Band Brake Replacement

1. Remove the tension spring (1).

Note:

- Take care not to extend or deform the tension spring.

2. After setting the band brake adjuster to the band holder assembling position, undo the claw of the snap-fit type and remove the band holder from the band brake adjuster by lifting it upward.

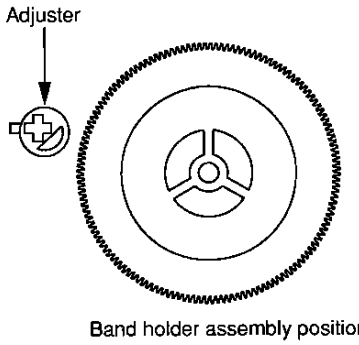


Fig. 6-23-1 Detail of band holder assembling

3. Undo the claw of the outsert on the mechanical deck catching the shaft of the tension lever assembly (3) and remove the tension lever assembly lifting it upward.
4. Remove the band brake (5) from the reel table while pulling the S soft brake lever (4) in the direction shown by the arrow.
5. Remove the band brake (5) from the hook on the tension lever assembly (3).

Note:

- Take care not to contaminate, bend or damage the felt surface on the band brake (5).

6. After replacing the tension lever assembly (3), clean the shaft on the tension lever and apply a few amount of oil.
7. Mount the parts in the reverse order of the removal.
8. After mounting, check the tension post position and perform the adjustment and back tension check.
9. After completion of the replacement, perform the adjustment from the linearity adjustment in the tape transport system adjustment.

Note:

- The band holder (2) can be replaced in the procedures described above steps 1 to 3.
- The band brake (5) can be replaced in the procedures described above steps 1 to 5.
- When replacing the band holder (2) and band brake (5), the linearity adjustment is not necessary.

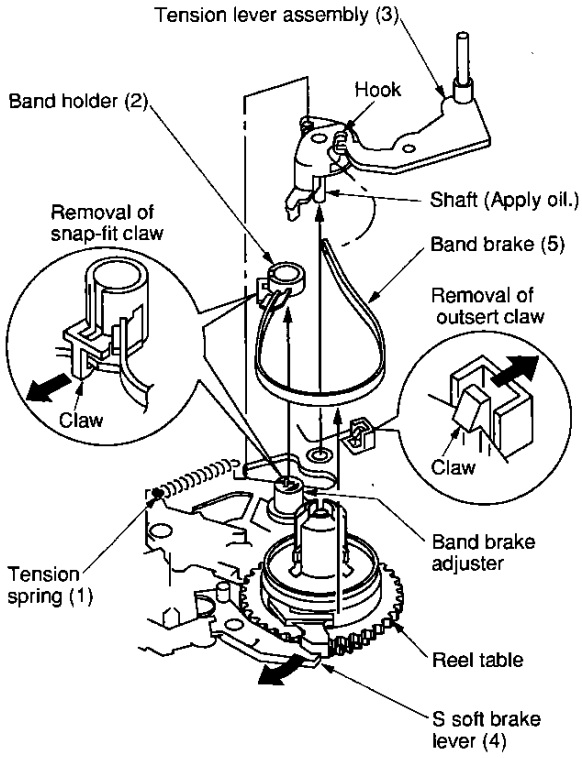


Fig. 6-23-2

1-6-24. S,T Loading Assembly Replacement

1. Remove the mechanical deck assembly from the main PC board.
2. Set the mechanical position to the F/L out position (front side). Turn over the mechanical deck.
3. Remove the loading slider assembly. (Refer to item "1-6-25. Loading Slider Assembly Replacement".)

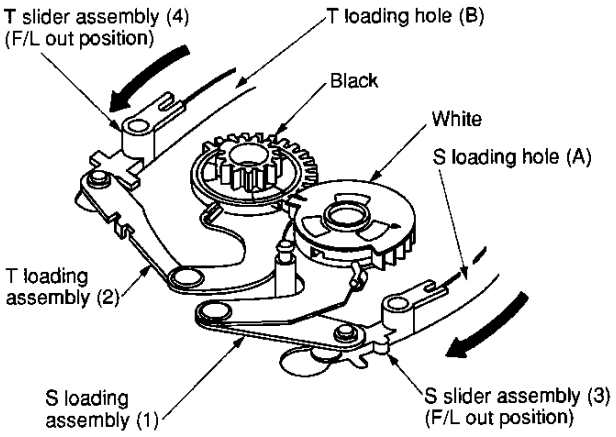


Fig. 6-24-1

4. Remove the S, T loading assemblies (1), (2).
5. Insert the S, T slider assemblies (3), (4) along the cutout of the S, T loading holes (A) and (B) on the mechanical deck and set the S, T slider assemblies (3), (4) to the loading position (rear side).
6. Insert the T loading assembly (2) to the post (C) on the T slider assembly (4) and the post (D) on the mechanical deck. And insert the S loading assembly (1) to the post (E) on the S slider assembly (3) and the post (F) on the mechanical deck.

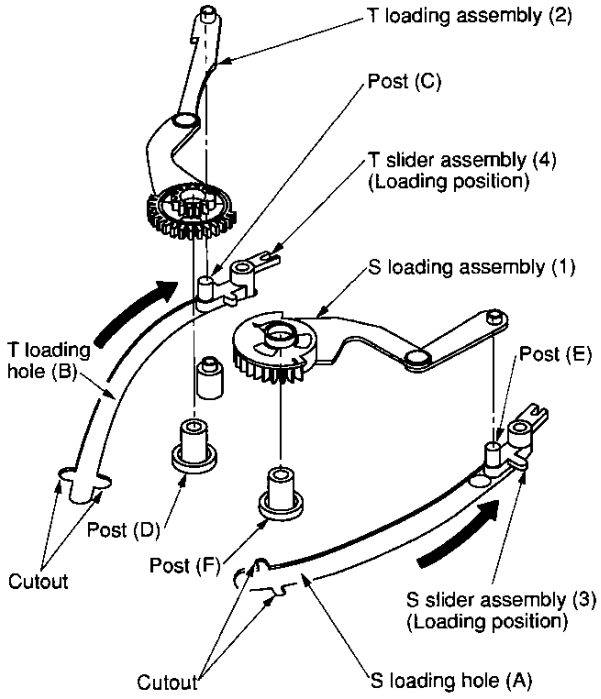


Fig. 6-24-2

Note:

- Align the phases of the ▲ marks on the S, T loading gear (1), (2).

7. Set the S, T slider assemblies (3), (4) to the F/L out position.

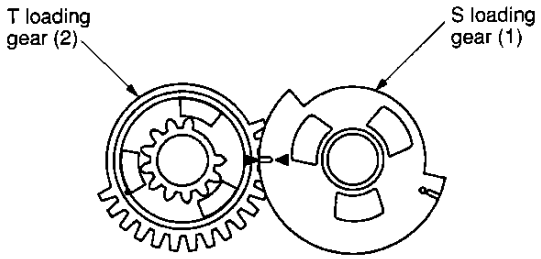


Fig. 6-24-3

1-6-25. Loading Slider Assembly Replacement

1. Remove the mechanical deck from the main PC board.
2. Set the mechanical position to the F/L out position.
3. Turn over the mechanical deck.
4. Remove the stop ring (1).
5. Remove the loading slider assembly (2) while lifting its tip upward using the mold portion on the loading slider assembly (2) as a fulcrum.
6. Mount the parts in the reverse order of removal.

Note:

- When mounting the loading slider assembly (2), insert the tip of the loading slider assembly (2) slightly to the mold portion, then mount it so that the claw on the outsert is in the position of the cutout portion of the loading slider assembly.
- Confirm that the position mark on the loading slider assembly (2) and the mark on the T loading gear match each other in position.

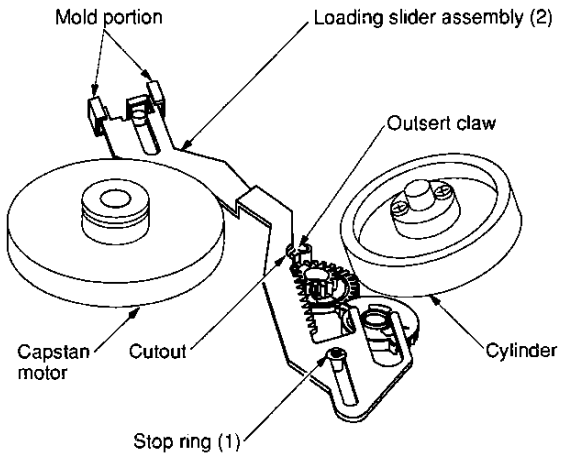


Fig. 6-25-1 View from Mechanical deck bottom side

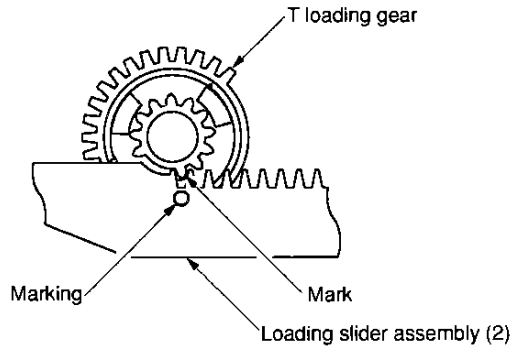


Fig. 6-25-2

1-6-26. Hook Lever Assembly Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Replacement".)
3. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
4. Remove the tension spring (1).
5. Turn the hook lever assembly (2) counterclockwise slightly, and remove the claw on the hook lever assembly (2) then replace.
6. After replacing the hook lever assembly (2) , insert the (A) portion of the hook lever under the S reel table assembly. When the portions (B), (C), (D) are in line, push the claw into the mechanical deck.

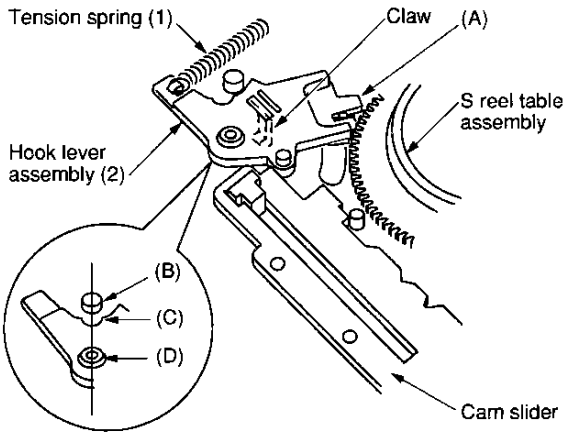


Fig. 6-26-1

7. Turn the hook lever assembly (2) clockwise till it stops, and mount the tension spring (1). After replacing the hook lever assembly (2), slide the cam slider in the direction shown by the arrow, and then position the boss (E) under the cam slider.

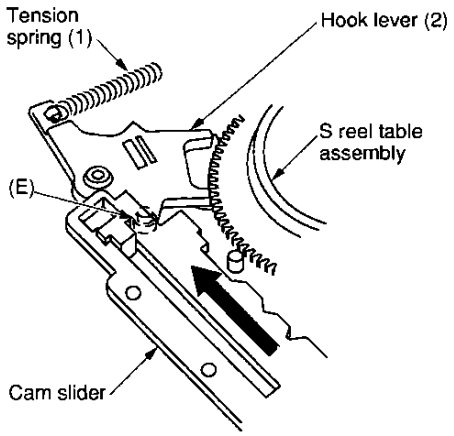


Fig. 6-26-2

1-6-27. Hook Replacement

1. Remove the hook lever assembly. (Refer to item "1-6-26. Hook Lever Assembly Replacement".)
2. Turn over the hook lever assembly (1) and remove the hook lever assembly (1) opening the portion (A) of the hook (2) slightly and lifting the hook (2) upward.
3. When mounting a new hook, push the hook (2) in the portion (B) from above.

Note:

- Take care not to confuse the mounting direction of the hook (2).

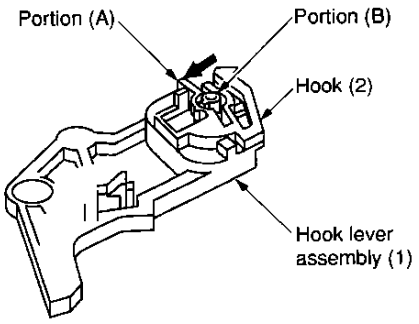


Fig. 6-27-1

1-6-28. Tension Drive Lever Replacement

1. Remove the cam slider. (Refer to item "1-6-41. Cam Slider Replacement".)
2. Turn over the mechanical deck and remove the tension drive lever (1) from the projection (A) moving counterclockwise slightly.
3. After replacing the tension drive lever (1) , mount in the reverse order of removal.

Note:

- For the cam slider mounting, refer to the notes in item 1-6-41.

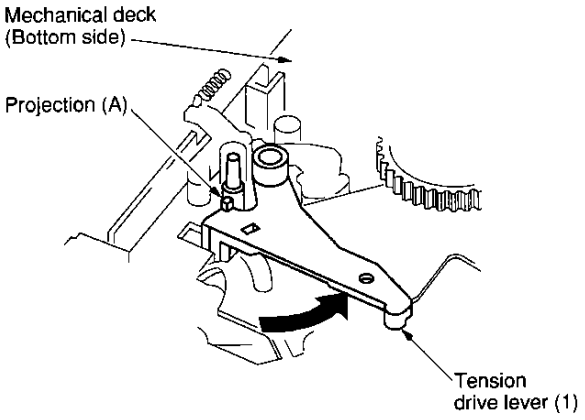


Fig. 6-28-1

1-6-29. Loading Drive Assembly Replacement

1. Remove the F/L ground plate and the head cleaner assembly. (Refer to item "1-6-14. Head Cleaner Assembly Replacement".)
2. Remove two flat cables (1) from the connectors.
3. Pull out the portion (A) (No. 8 guide cap) from the motor bracket (2).
4. Remove four claws (a), (b), (c), (d) securing the motor bracket in the order of (a) → (b) → (c) → (d).

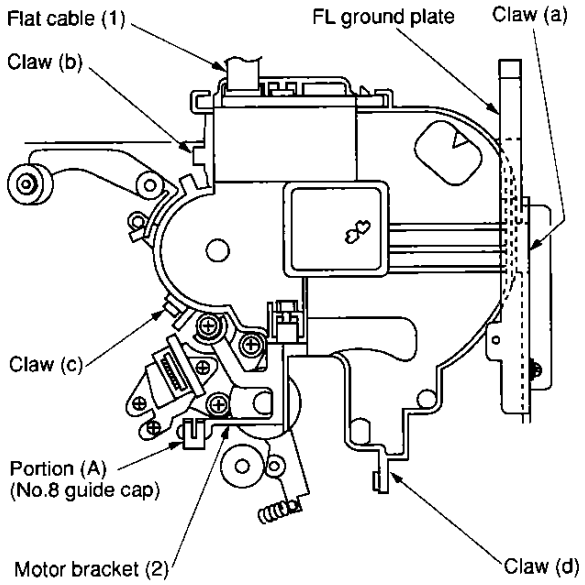


Fig. 6-29-1

Note:

- Remove the claw (a) inserting a driver.
- Remove the claws (b) and (c) pushing inside previously and opening the claws slightly.

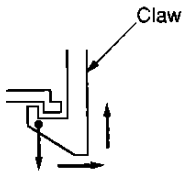


Fig. 6-29-2

<Preparation for Loading drive assembly mounting >

a) Confirm that the head cleaner assembly is removed.

b) Confirm that the small hole b) on the cam gear aligns with the hole on the mechanical deck.

c) Confirm that the clearance between the pinch lever assembly and the cam gear is approx. 0.3 mm. (Confirm that the pinch lever assembly is correctly mounted on the groove of the cam gear.)

d) Confirm that the clearance between the drive lever and the cam gear is approx. 2 mm. (Confirm that the drive lever is correctly mounted on the groove of the cam gear.)

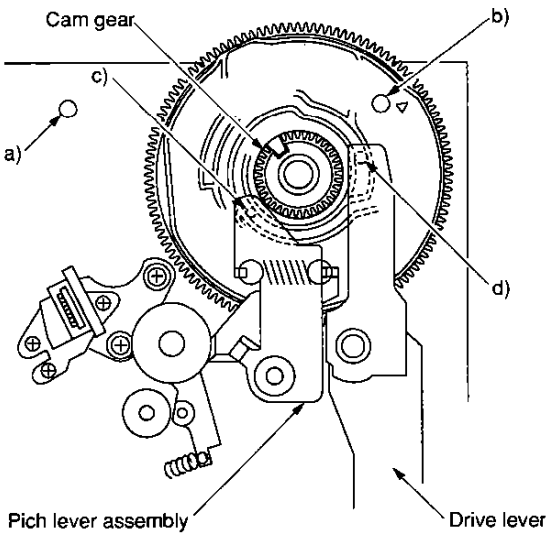
e) Confirm that the Δ mark on the rotor of the cam switch aligns with the Δ mark on the motor bracket.

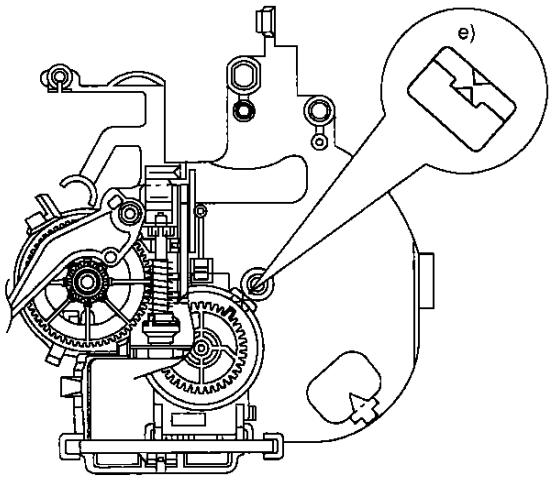
5. After completion above steps a) to e), mount the loading drive assembly. Push four claws to the motor bracket in the order of (d) → (c) → (b) → (a) and push the portion (A) (No. 8 guide cap) into the motor bracket.

6. Confirm that the Δ mark on the rotor of the cam switch aligns with that on the bracket when the hole b) on the cam gear aligns with the hole on the mechanical deck. If the alignment of the Δ marks cannot be confirmed, remove loading drive assembly once again and reinstall after confirming the above steps a) to e).

7. Mount two flat cables.

8. Mount the F/L ground plate and the head cleaner assembly.



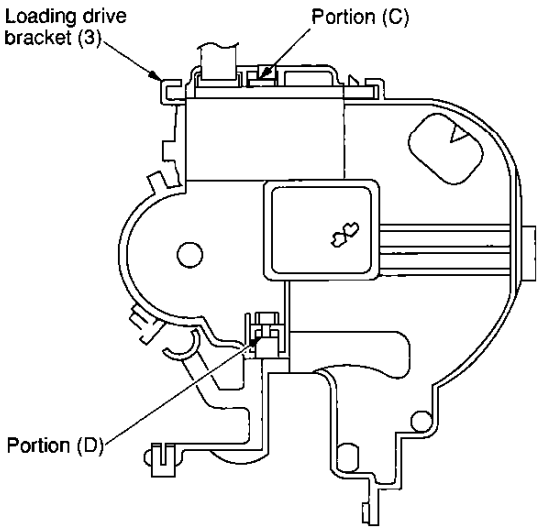


Loading drive assembly bottom side

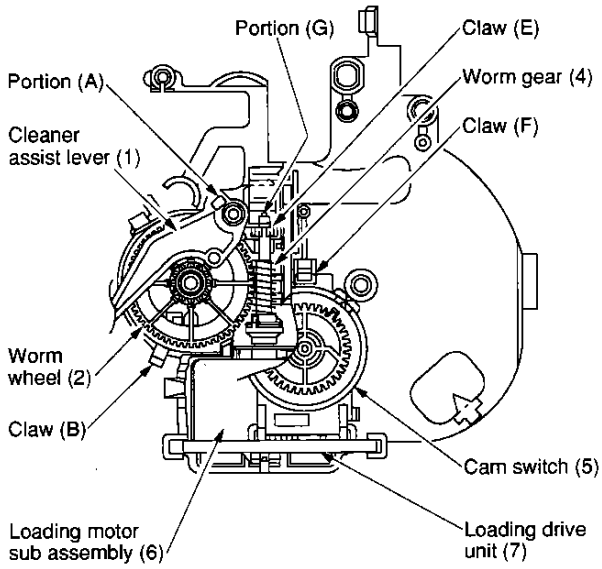
Fig. 6-29-3

1-6-30. Loading Motor Sub Assembly, Cam Switch and Loading Drive Unit Replacement

1. Remove the loading drive assembly. (Refer to item "1-6-29. Loading Drive Assembly Replacement".)
2. Remove the cleaner assist lever (1) from the claw (A).
3. After removing the cleaner assist lever (1), the worm wheel can be also removed upward.
4. Insert a slot-type screwdriver into the portion (C) of the loading drive bracket (3) and push the loading motor 2 – 3 mm lower. And push the tip of worm gear from the portion (D) of the loading bracket (3), then remove the worm gear (4) from the claw (E).
5. Remove the cam switch (5) from the claw (F) on the loading drive bracket (3) and pull out the loading drive unit (7) and the worm gear (4) simultaneously.
6. Replace the loading drive unit (7). When mounting the PC boards of the cam switch (5) and the loading drive unit (7), take care that no clearance is allowed.
7. Insert the loading drive unit (7) and the worm gear (4) into the loading drive bracket (3).
8. Push the tip (G) of the worm gear (4) into the claw (E) on the loading motor bracket.
   In this process, take care not to bend the tip of the worm gear with strong pressure.
9. Push the cam switch (5) into the claw (F) on the loading motor bracket.
10. Mount the parts in the reverse order of removal.



Loading drive assembly (Top Side)



Loading drive assembly (Bottom side)

Fig. 6-30-1

1-6-31. Cam Gear Replacement

1. Remove the loading drive assembly. (Refer to item "1-6-29. Loading Drive Assembly Replacement".)
2. Remove the cam slider. (Refer to item "1-6-41. Cam Slider Replacement".)
3. Remove the drive lever. (Refer to item "1-6-40. Drive Lever Replacement".)
4. Remove the pinch roller assembly. (Refer to item "1-6-21. Pinch Assembly Replacement".)
5. Remove the cam gear.
6. Apply grease on a new cam gear on the shaded portion as shown in Fig. 6-31-1 and the shaft of the main base.

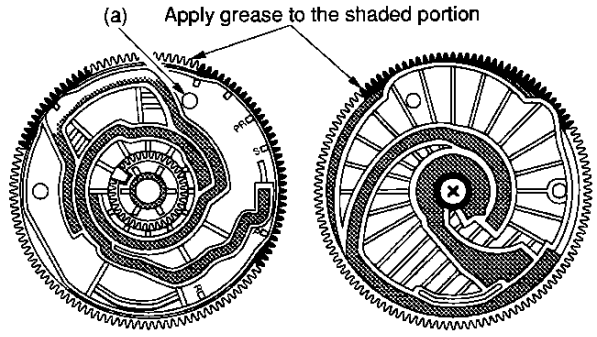


Fig. 6-31-1

7. Make the S, T slider to the slot out condition.
8. Push the cam lever (1) and the pin (2) (loading slider) in the direction shown by the arrows (A) and (B).
9. Mount the cam gear at the angle which the small hole (a) on the cam gear aligns with the hole on the mechanical deck. (Refer to Fig. 6-31-1.)

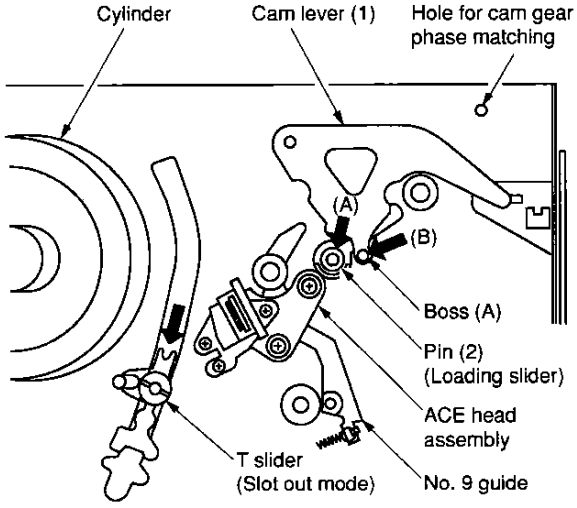


Fig. 6-31-2

10. Mount the parts in the reverse order of removal.

1-6-32. S Reel Table Assembly and Washer 2 Replacement

1. Remove the top bracket and the cassette holder assembly. (Refer to item "1-6-1. Top Bracket Replacement and 1-6-2. Cassette Holder Assembly Replacement".)
2. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
3. Remove the cam slider. (Refer to item "1-6-41. Cam Slider Replacement".)
4. Remove the S soft brake and S main brake assembly. (Refer to item "1-6-38. S Soft Brake Replacement and 1-6-37. S Main Brake Assembly Replacement".)
5. Remove the tension lever assembly. (Refer to item "1-6-23. Tension Lever Assembly Replacement".)
6. Remove the S reel table assembly (1) pulling it out upward.
7. Remove the washer 2 (2).
8. After cleaning the reel shaft (3) with a cleaning kit, insert a new washer 2 (2) to the reel shaft (3) and apply a drop of oil to the shaded portions (two locations) on the reel shaft (3).
9. After replacing, mount the parts in the reverse order of removal.
10. Confirm the reel torque using a torque cassette.

Note:

- The washer 2 (2) can use repeatedly.

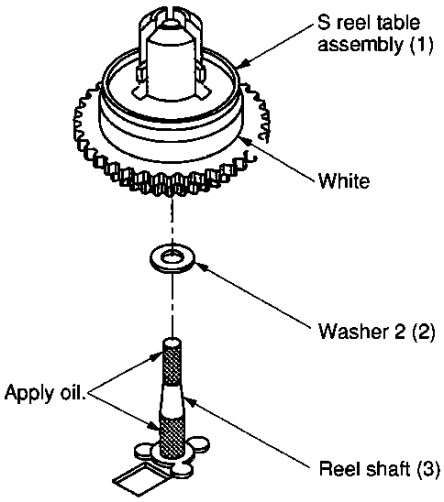


Fig. 6-32-1

1-6-33. T Reel Table Assembly and Washer 2 Replacement

1. Remove the top bracket and the cassette holder assembly. (Refer to item "1-6-1. Top Bracket Replacement and 1-6-2. Cassette Holder Assembly Replacement".)
2. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
3. Remove the T soft brake and T main brake assembly (Refer to item "1-6-41. Cam Slider Replacement".)
4. Remove the T reel table assembly (1) pulling it out upward.
5. Remove the washer 2 (2).
6. After cleaning the reel shaft (3) with a cleaning kit, insert a new washer 2 (2) to the reel shaft (3) and apply a drop of oil to the shaded portions (two locations) on the reel shaft (3).
7. After replacing, mount the parts in the reverse order of removal.
8. Confirm the reel torque using a torque cassette.

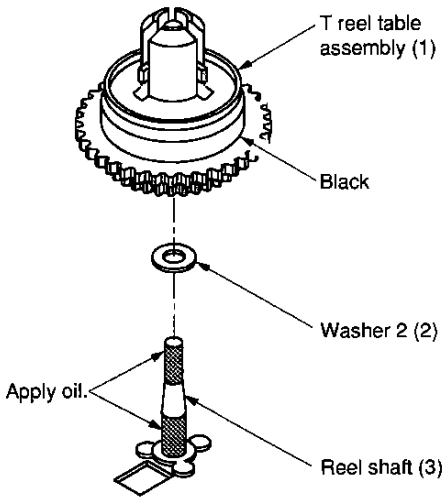


Fig. 6-33-1

Note:

- Washer 2 (2) can use repeatedly.

1-6-34. Idle Arm Assembly Replacement (Center Gear Pulley, Idle Kick Lever, Idle up/down Lever)

1. Remove the mechanical deck from the main PC board.
2. Remove the stop ring (1) turning over the mechanical deck.
3. Remove the center gear pulley (2) lifting it upward.
4. Remove the claw (A) on the idle kick lever (3) moving and pulling it upward.
5. Remove the slit washer (4).
6. Remove the idle up/down lever (5) and the idle arm (6) simultaneously from two claws (B) on the mechanical deck.
7. After cleaning the center gear post (7) using a cleaning kit, apply a few drops of oil to the shaded portion on the center gear post.
8. Mount the parts in the reverse order of removal.

Note:

- Stop ring (1) is impossible to use again.
- When mounting the parts, take care of the notice shown in Fig. 6-34-2.

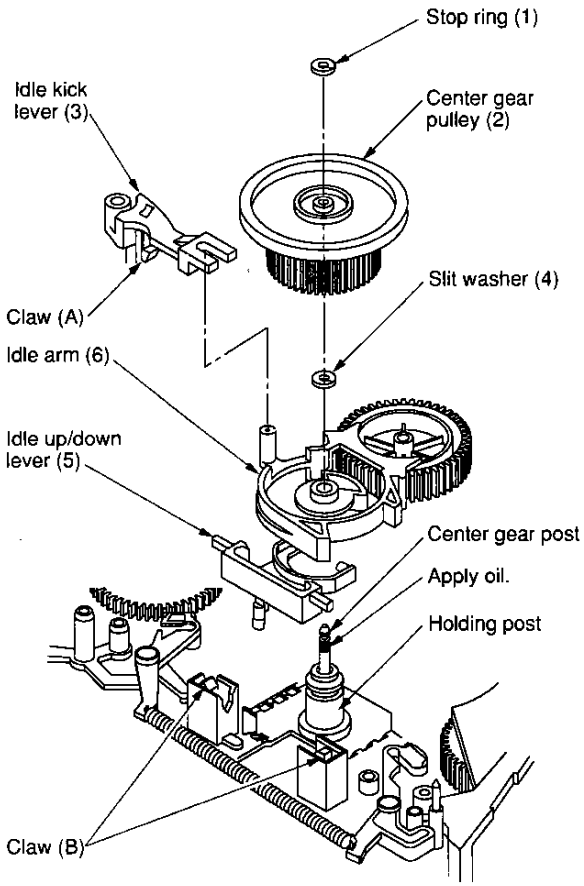


Fig. 6-34-1

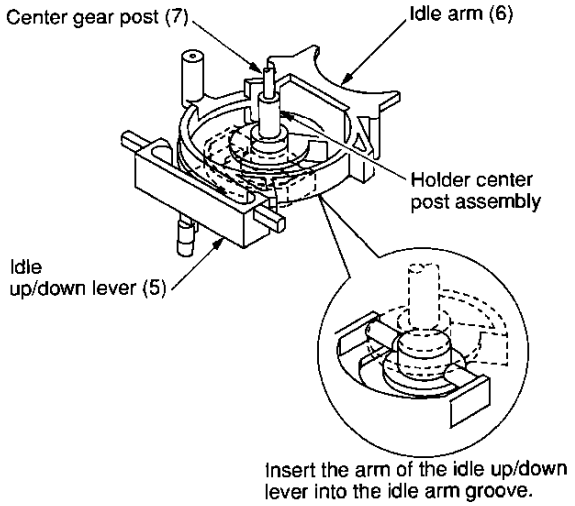

Center gear post (7)
Idle arm (6)
Holder center post assembly
Idle up/down lever (5)
Insert the arm of the idle up/down lever into the idle arm groove.

Fig. 6-34-2

1-6-35. Holder Center Post Assembly Replacement

1. Turn over the mechanical deck and remove the center gear pulley and the idle arm. (Refer to item "1-6-34. Idle Arm Assembly Replacement".)
2. Turn over the mechanical deck and remove the top bracket and the cassette holder assembly. (Refer to item "1-6-1. Top Bracket Assembly Replacement and 1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
4. After removing two screws (1), replace the holder center post assembly (2).
5. After replacing, mount the parts in the reverse order of removal.

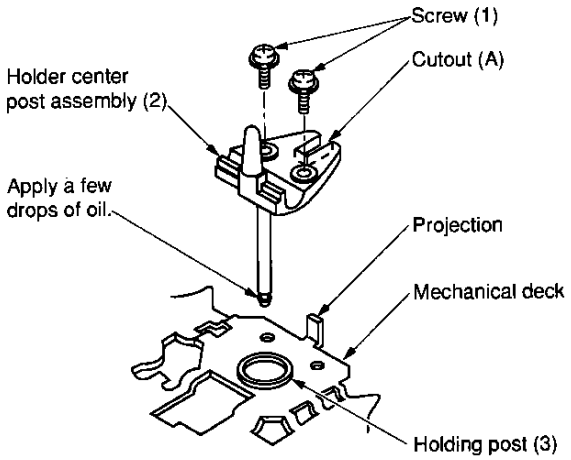


Fig. 6-35-1

Note:

- When mounting, push the cutout (A) on the holder center post assembly (2) aligning with the projection on the mechanical deck.
- Screw tightening torque is 294 – 392 mN•m (3 – 4 kg•cm).
- Before mounting the center gear pulley, apply a few drops of oil. (Refer to Fig. 6-34-1.)

1-6-36. REC Inhibiting Lever Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the cam slider. (Refer to item "1-6-41. Cam Slider Replacement".)
4. Remove the tension spring (2).
5. Undo the claw (A) on the S soft brake (1) sliding and lifting it upward.
6. Remove the projection (B) on the REC inhibiting lever (3) sliding in the direction shown by the arrow and lifting it upward.
7. After replacing the REC inhibiting lever (3), mount the parts in the reverse order of removal.

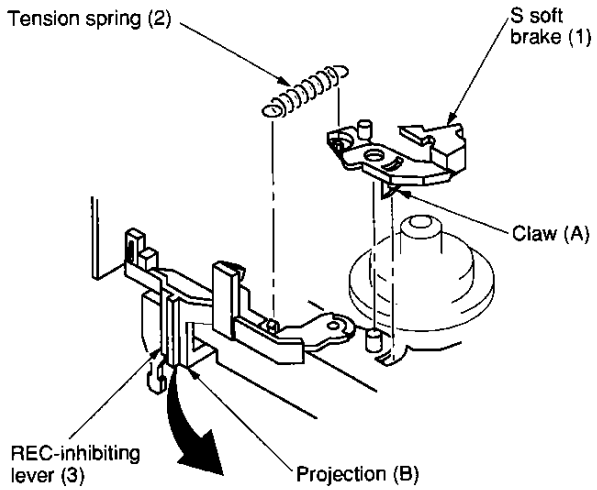


Fig. 6-36-1

1-6-37. S, T Main Brake Assembly Replacement

1. Remove the mechanical deck from the main PC board and turn the mechanical deck upside down.
2. When replacing the T main brake assembly (2), first remove the idle kick lever (3). (Refer to item "1-6-34. Idle Arm Assembly Replacement".)
3. Remove the tension spring (4).
4. Remove the claws on the S, T main brakes (1), (2) from the mechanical deck lifting the S, T main brakes (1), (2) upward.
5. After replacing the S, T Main brake assemblies (1), (2), mount the parts in the reverse order of removal.

Note:

- When mounting the S, T main brake assemblies (1), (2) take care that both ends of the S, T main brakes (1), (2), do not touch the gear of the reel table.

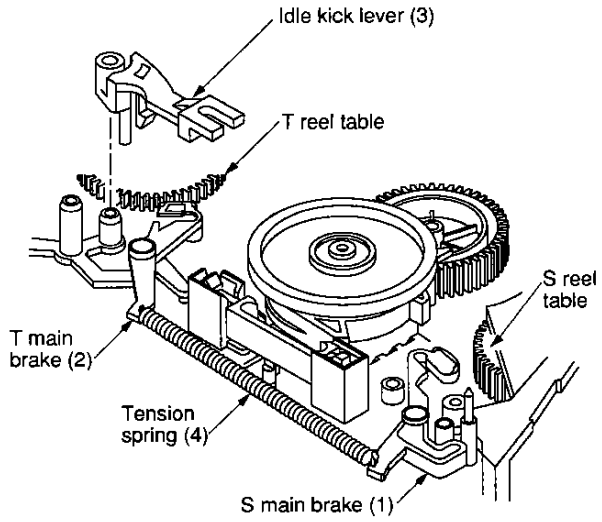


Fig. 6-37-1

1-6-38. S Soft Brake Replacement

1. Remove the cam slider. (Refer to item "1-6-41. Cam Slider Replacement.")
2. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
3. Remove the S soft brake spring (1).
4. Remove the S soft brake (2) after removing the claw (A) on the S soft brake from the mechanical deck.

Note:

- When mounting the S soft brake spring (1), take care not to deform the hook (B).
- When mounting the S soft brake (2), take care of the band brake (3).

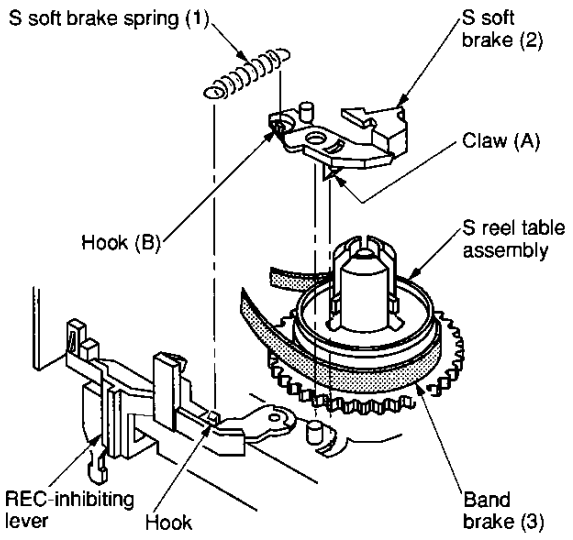


Fig. 6-38-1

1-6-39. T Soft Brake Replacement

1. Remove the T soft brake spring (1).
2. Remove the claw (A) on the T soft brake (2) from the mechanical deck and remove the T soft brake (2).
3. After replacing the T soft brake (2), mount the parts in the reverse order of removal.

Note:

- When mounting the T soft brake spring (1), take care not to deform the hook (B).
- Take care not to touch the surface (C) on the brake pad.

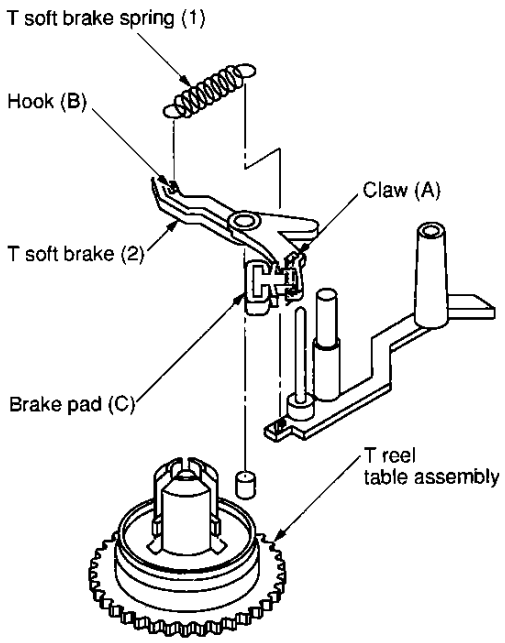


Fig. 6-39-1

1-6-40. Drive Lever Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
4. Remove the cam slider. (Refer to item "1-6-41. Cam Slider Replacement".)
5. Remove the Loading Drive Assembly. (Refer to item "1-6-29. Loading Drive Assembly Replacement.")
6. Remove the drive lever (1).
7. After replacing the drive lever (1), mount the parts in the reverse order of removal.

Note:

- Be sure to align the phase of the cam gear (2). (Refer to item 1-6-41. Cam Slider Replacement".)
- Mount the drive lever (1) so that it is positioned between the mark (A) on the mechanical deck and the outsert (B).
- Apply grease to the surface between the mark (C) on the mechanical deck and the drive lever shaft (D).

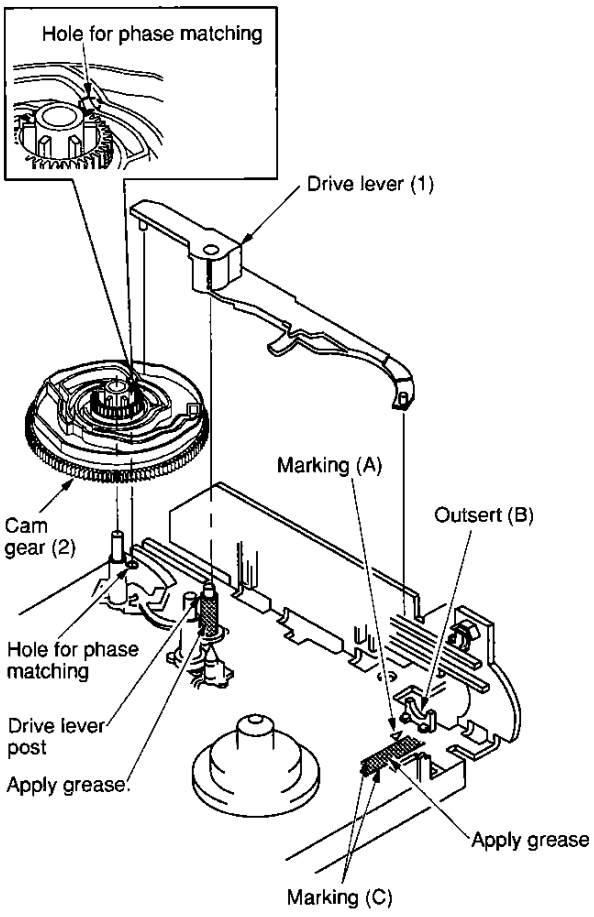


Fig. 6-40-1

1-6-41. Cam Slider Replacement

1. Remove the top bracket and the cassette holder assembly. (Refer to item "1-6-1. Top Bracket Replacement and 1-6-2. Cassette Holder Assembly Replacement".)
2. Remove the tension spring (1).
3. Turn the hook lever assembly (2) counterclockwise and turn the S soft brake (3) counterclockwise.
4. Move the cam slider (4) to the right and align the projection (A) on the mechanical deck and the cutout portion (B) on the cam slider (4).
5. Remove the claw (C) on the cam slider (4) and remove the cam slider (4) lifting the cam slider (4) upward.

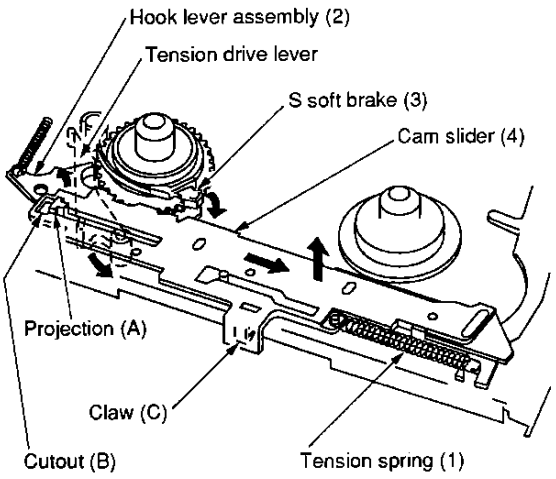


Fig. 6-41-1

6. Apply grease on the shaded portion of a new slider for the replacement.
7. Mount the parts in the reverse order of removal. After inserting the cam slider, slide it to the left direction till it stops. (Fig. 6-26-2 shows this condition.)

Note:

- When mounting the cam slider (4), slide the tension drive lever in the direction shown by the arrow (counterclockwise).
- After completion of the replacement, confirm that the cam slider (4) can slide to left and right directions smoothly.

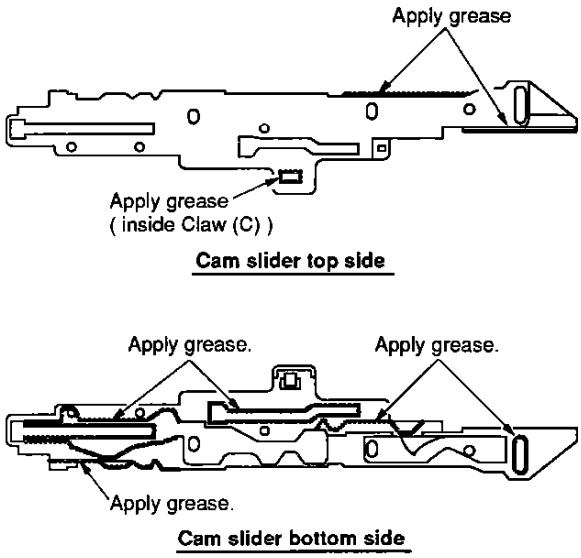


Fig. 6-41-2

1-6-42. Idle Centering Lever Replacement

1. Remove the cam slider. (Refer to item "1-6-41. Cam Slider Replacement".)
2. Remove the claw on the idle centering lever (1) and remove the idle centering lever (1) lifting it upward.
3. After replacing the idle centering lever (1), mount the part in the reverse order of removal.

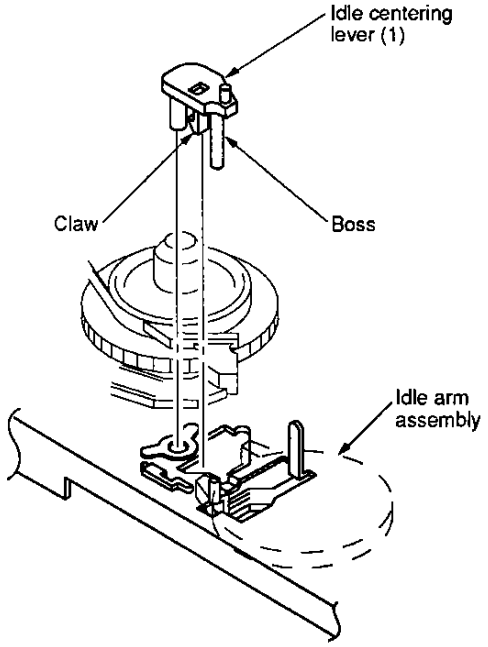


Fig. 6-42-1

1-6-43. Capstan Motor Replacement

1. Remove the reel belt (1).
2. Remove one screw (2) from the bottom of the mechanical deck, and remove the PC board (3).

Note:

- Take care not to misuse the screw with others.

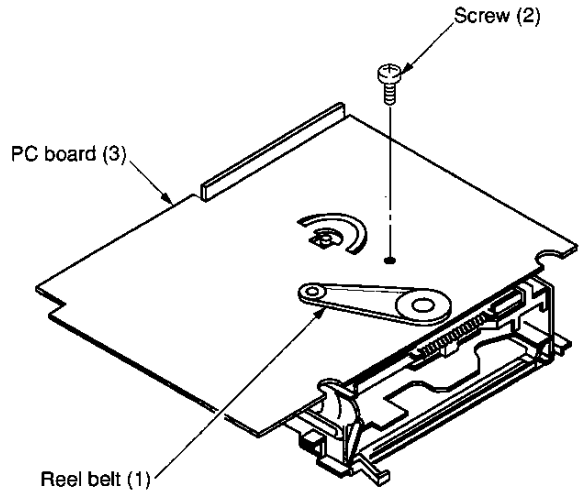


Fig. 6-43-1

3. Remove the capstan motor (4) after removing three screws (5).

Note:

- Take care not to drop the capstan motor.

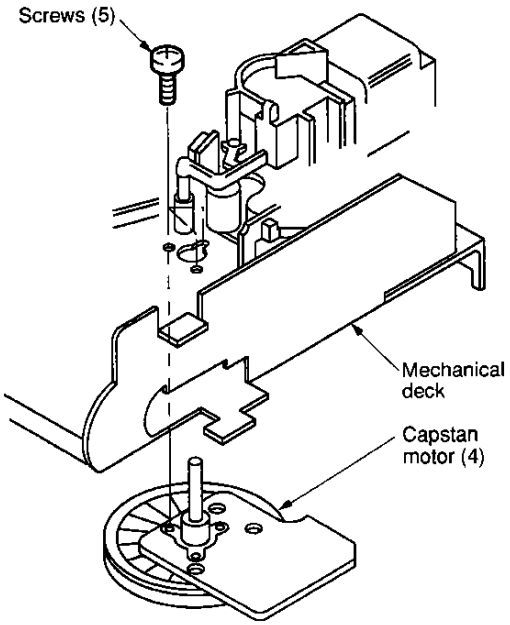


Fig. 6-43-2

4. Take care not to damage and scratch the motor itself, and mount the capstan motor (4) fitting the hole (A) on the mechanical deck and the hole (B) on the capstan motor (4).

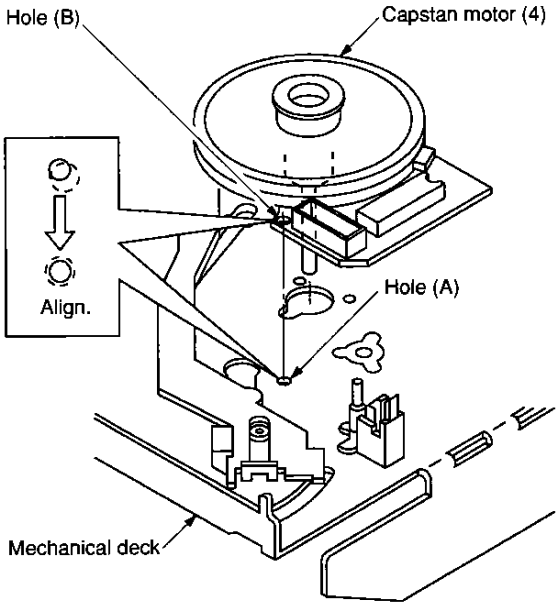


Fig. 6-43-3

5. Mount the capstan motor (4) with three screws (5) viewing from the top side of the mechanical deck.

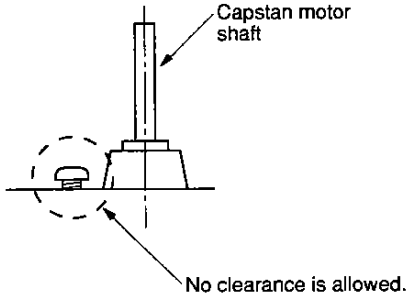


Fig. 6-43-4

Note:

- Do not use once-removed screws again.
- Take care that no clearance is allowed when securing three screws.

6. After replacement, mount the parts in the reverse order of removal.

Note:

- In this case, take care not to twist the reel belt and stick the grease or etc. on it.

7. After replacing, perform the adjustment according to the tape transport adjustment procedures.

1-6-44. S-VHS Switch Assembly Replacement (S-VHS model only)

1. Slide the cassette holder assembly (1) until the screw (2) can be seen from the hole on the top bracket (3).
2. Insert a screwdriver from the hole provided on the top bracket (3) and secure the screw (2).
3. Remove the S-VHS switch assembly (4) upward.
4. After completion of the replacement, mount the parts in the reverse order of removal.

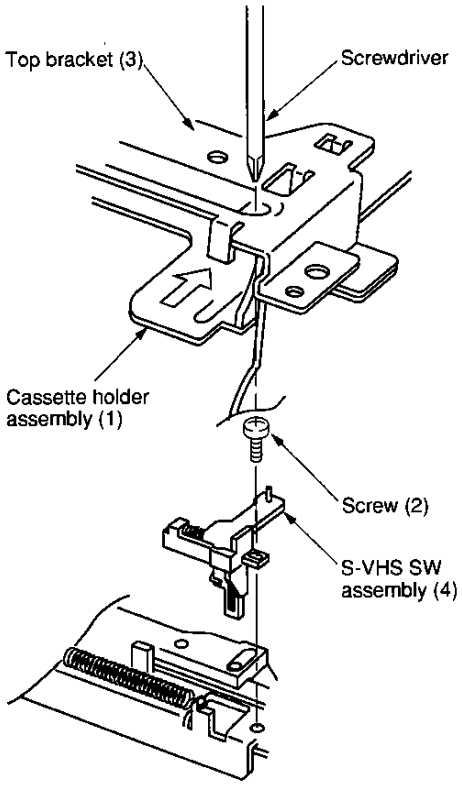


Fig. 6-44-1

1-7. Check and Adjustment

1-7-1. Check of Tension Pole Position

1. Turn the worm wheel counterclockwise after removing the cassette holder assembly on the front loading mechanism, and set the cam gear at playback position.
2. Turn the S reel table assembly (1) clockwise slowly.
3. Adjust the adjuster (3) counterclockwise from the position shown in Fig. 6-23-1 so that the clearance between the left end of the tension lever assembly (2) and the left side of the mechanical deck becomes 7.5 ± 1 mm.

Note:

- There is a long mark at the position of 7.5 mm from the round surface of the mechanical deck. Make sure the position of the mark when adjusting.

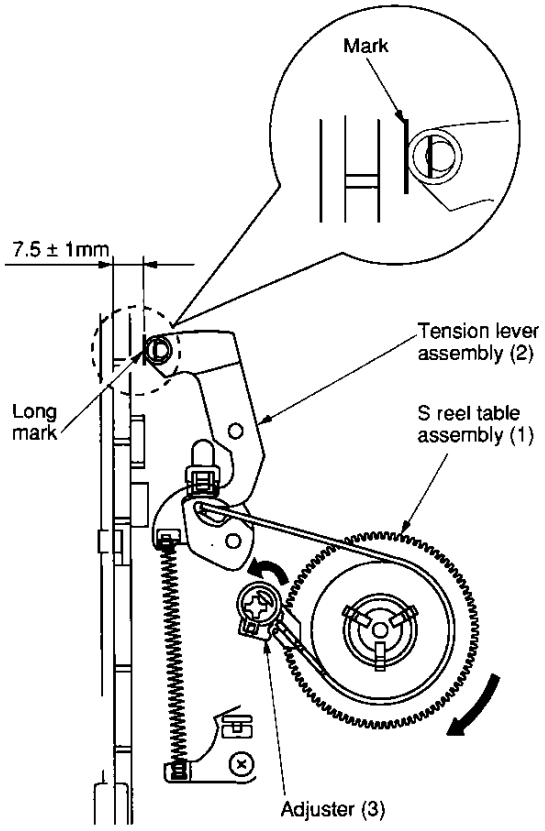


Fig. 7-1-1

1-7-2. Reel Torque Check

(1) Reel torque

1. REVIEW mode (supply side)

   Poor torque may not wind the tape. On the other hand, excessive torque will cause damage to the tape during REVIEW mode.

2. Record/Playback mode (take-up side)

   Too little torque does not rewind the tape to the end. If too large torque, the tape may be stretched by excessive tension.

3. Inspection

   Rewind the torque cassette to the end, then check the torque values shown below:

Review	15.95 ± 3.65 mN•m (162.5 ± 37.5 g•cm)
Record/Playback	6.85 ± 2.45 mN•m (70 ± 25 g•cm)

   For checking method, refer to the following item (2).

(2) Reel torque and back tension check

1. First, record a TV broadcast program on the entire torque cassette tape (KT-300NR) in the SP mode.
2. Load the torque cassette tape (KT-300NR) in the VTR and feed it forward until the end of the tape, before proceeding with measurement.
3. Set the VTR to the REVIEW mode and feed the tape for about 15s, and then make sure the take-up torque described above is obtained while observing the left torque meter.
4. After completion of step 3), feed forward to tape start position and set the VTR to the PLAY mode and feed the tape for about 30s. Read the right torque meter and check the torque described above is obtained.
5. If the review torque and playback torque are out of limit, replace the clutch assembly.
6. When the S reel table assembly, the T reel table assembly and the idle arm assembly are replaced, perform the reel torque check.

<Precautions for Use of Torque Cassette (KT-300NR)>

1. Before loading a torque cassette in a VTR, always remove tape slack. The tape slack can be removed by rotating the reel to its take-up direction. (The tape tends to slack when there is no reel brake actions.)
2. When the torque cassette is loaded, confirm followings:
   - Make sure the tape does not ride up or over the No. 8 cap. If it does, do not eject the tape but return the tape to its correct position, taking care not to damage the tape.
   - Make sure the tape is not slackened. If slackened, operate the VTR in FF or REW mode and then stop the tape. Then make sure the tape is not slackened again.
   - After above confirmation, proceed to the reel torque adjustment and confirmation.
3. Caution for removal of torque cassette
   - When removing the torque cassette from the VTR, set the VTR to the STOP mode and wait for several seconds. Then, make sure the tape is not slackened. Push the EJECT button to remove the cassette.
4. If the previous precautions 1), 2) and 3) are not performed properly, the tape may be damaged and correct measurements can not be performed.
5. Do not use worn out or damaged tape, if used they may damage video heads on the cylinder. In such a case always replace the tape with a new one. The replacement tape is of E-180, 10 m in length.

1-7-3. Tape Transport System

The tape transport system has been precisely adjusted in the factory, so no check and alignment are necessary except the followings:

- Noises observed on the screen
- Tape damage
- Parts, shown in the adjustment procedures for the tape transport system were replaced.

Electrical signal output terminal required for adjustment differs depending upon the models. Refer to the test point location in the Electrical Adjustment Section.

(1) Location of tape transport adjustment

<Adjustment reference>

Lower flange height of No. 8 guide is used as the basic reference for the transport adjustment. To keep height of the No. 8 guide, do not apply excessive force onto the main base to prevent the main base from deformation.

Rectangles shown in Figs. 7-3-1, 7-3-2 show the adjusting locations.

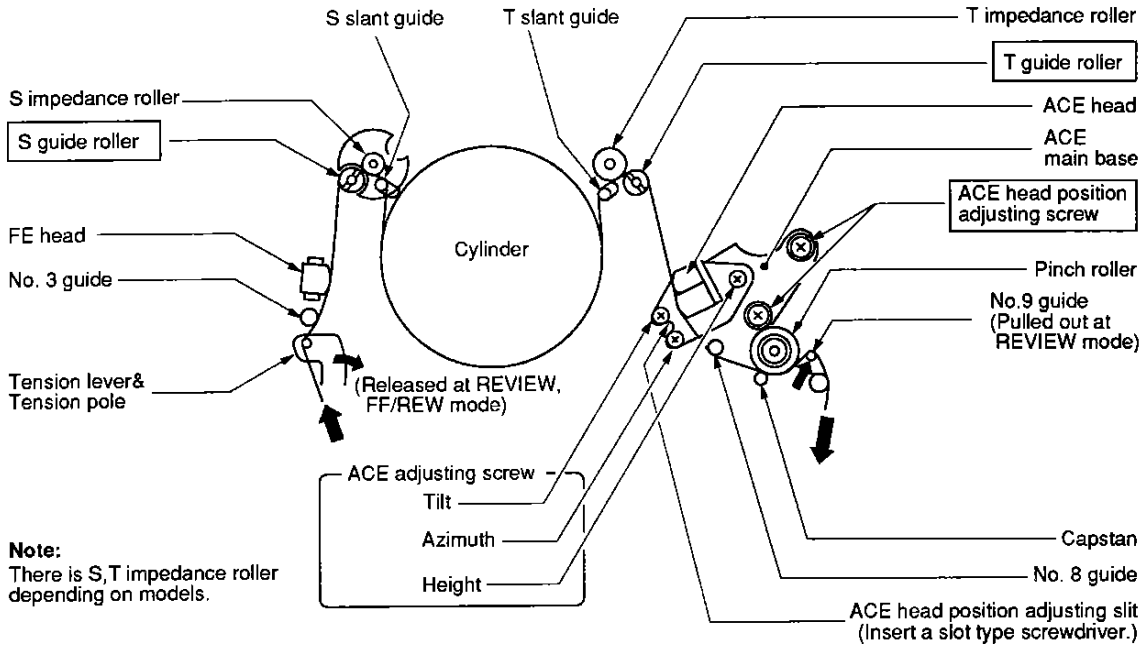


Fig. 7-3-1 Tape travel diagram

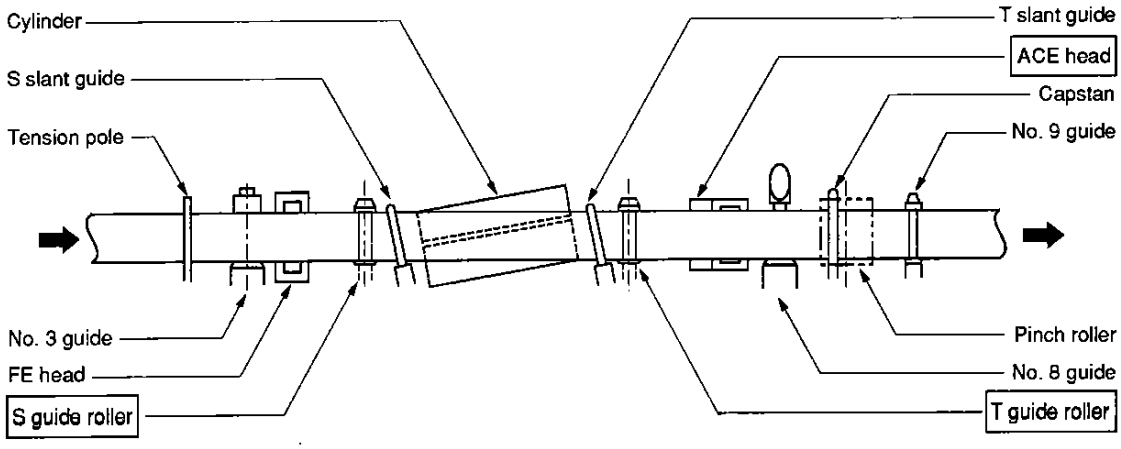


Fig. 7-3-2 Location of tape transport adjustment

(2) Tape transport system adjustment flow chart

Cylinder assembly replacement
S, T slider replacement
ACE head assembly replacement
Capstan motor assembly replacement
Pinch lever assembly replacement
Cylinder motor replacement

Upper cylinder assembly replacement

S, T guide roller replacement
Tension lever assembly replacement
Impedance roller replacement
FE head replacement

Reel clutch assembly replacement
Reel table replacement
Taper nut replacement

1) ACE head assembly coarse adjustment

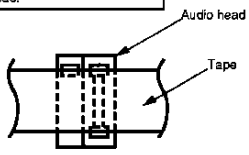
2) Playback phase adjustment

3) Linearity adjustment (S, T guide roller)

4) ACE haed assembly fine adjustment

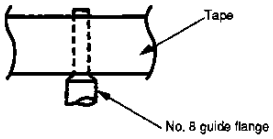
1. AUDIO HEAD HEIGHT ADJUSTMENT (AUDIO HEIGHT ADJUSTING SCREW)

Playback the tape recorded in SP mode. Adjust position of the upper flange of tape end that of the audio head.



2. AUDIO HEAD TILT ADJUSTMENT (TILT ADJUSTING SCREW)

Playback the tape in SP mode continuously. Adjust Audio head tilt screw so that tape transports along lower flange of No. 8 guide.



3. AUDIO AZIMUTH ADJUSTMENT (AZIMUTH ADJUSTING SCREW)

Playback 7 kHz audio signal on alignment tape and adjust for max. output.

4. ACE HEAD POSITION ADJUSTMENT

Playback video envelope signal 3 MHz (A ch) on alignment tape in SP mode. Set tracking control at its center. Adjust ACE main base to obtain max. output.

Adjust as described in the Electrical Adjustment Section (Servo circuit.) in each service data.

(Note 1)

1. MAXIMUM ENVELOPE OUTPUT

Playback the 3 MHz video signal on the alignment tape.
Trigger scope with switching pulse.
Adjust tracking control for maximum envelope output by pushing channel (tracking) up/down buttons.

2. ENTRANCE SIDE ENVELOPE ADJUSTMENT

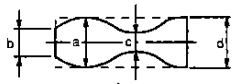
Rotate S guide roller until entrance side envelope becomes as flat as possible.

3. EXIT SIDE ENVELOPE ADJUSTMENT

Rotate T guide roller until exit side envelope becomes as flat as possible.

4. LINEARITY CHECK

Press the channel (tracking) up/down buttons alternately, make sure envelope increases or decreases with flat response kept.



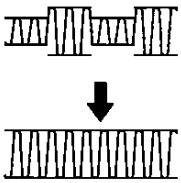
c/a ≧ 0.75
b, d/a ≧ 0.63 } (S-VHS model)

b, c, d/a ≧ 0.75 (Non S-VHS model)

(Note 1) For the linearity adjustment, make sure adjusted value should be checked with 3 MHz (SP) video signal after completion of specified adjustments using 3 MHz (LP) video signal in alignment tape.

1. ACE HEAD HEIGHT FINE ADJUSTMENT

Playback stereophonic alternative recording signal (300-500Hz) on alignment tape.
Turn the Audio height adjusting screw until audio envelope signal becomes as flat as possible.



2. AUDIO HEAD TILT FINE ADJUSTMENT

Playback alignment tape in CUE or double speed mode.
Adjust Audio head tilt untill tape runs along lower flange of No. 8 guide.

3. ACE HEAD HEIGHT FINE ADJUSTMENT

Playback alignment tape as described in step 1, make sure audio envelope signal becomes as flat as possible

NG

OK

4. AUDIO HEAD AZIMUTH FINE ADJUSTMENT

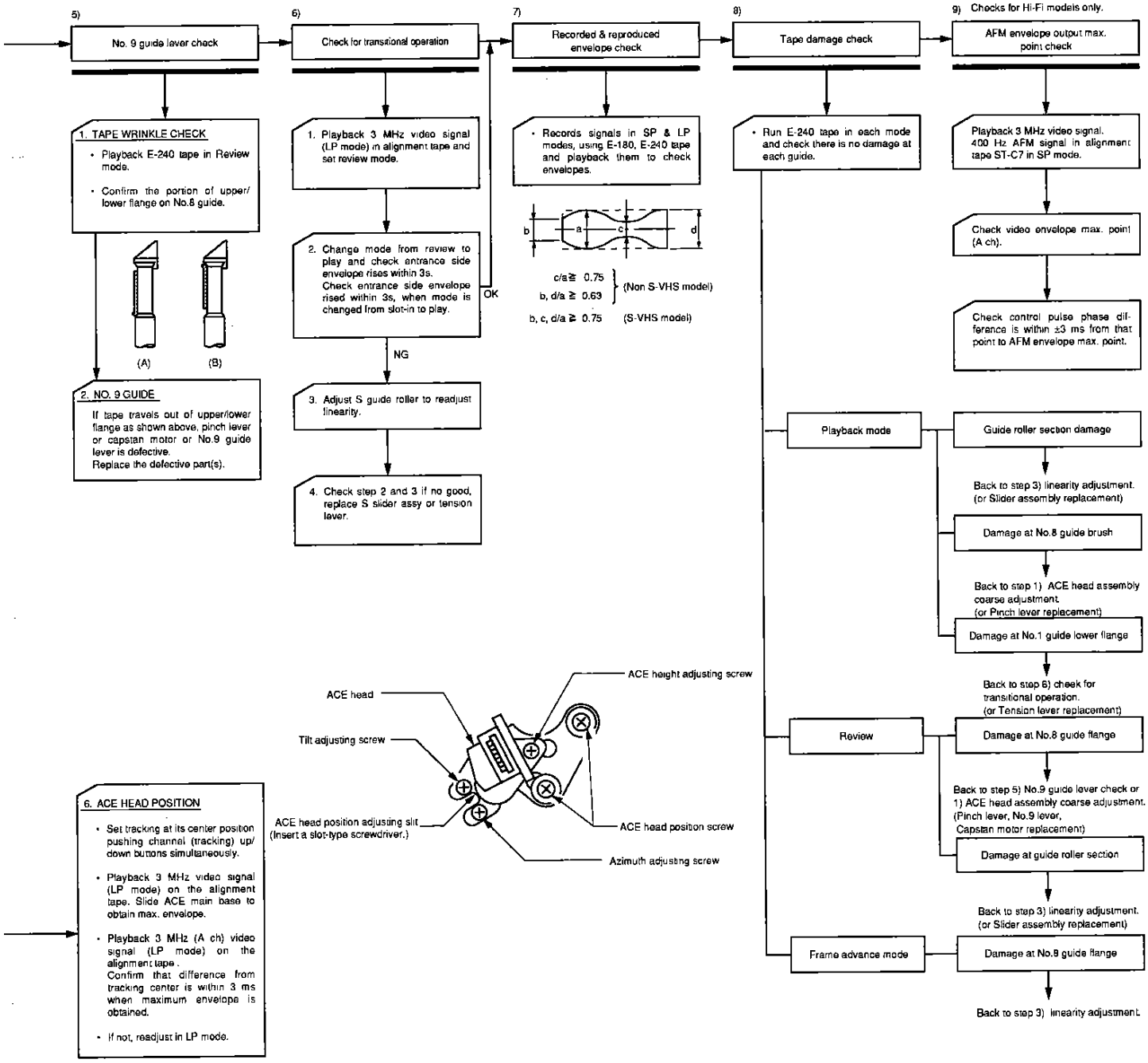
Playback 7 kHz audio signal on alignment tape.
Turn the azimuth adjusting screw to obtain maximum output.

5. AUDIO HEAD HEIGHT CHECK

Repeat same step as step 3.

NG

OK


5)
No. 9 guide lever check
1. TAPE WRINKLE CHECK
• Playback E-240 tape in Review mode.
• Confirm the portion of upper/lower flange on No.8 guide.
(A)
(B)
2. NO. 9 GUIDE
If tape travels out of upper/lower flange as shown above, pinch lever or capstan motor or No.9 guide lever is defective.
Replace the defective part(s).
6)
Check for transitional operation
1. Playback 3 MHz video signal (LP mode) in alignment tape and set review mode.
2. Change mode from review to play and check entrance side envelope rises within 3s.
Check entrance side envelope rised within 3s, when mode is changed from slot-in to play.
OK
NG
3. Adjust S guide roller to readjust linearity.
4. Check step 2 and 3 if no good, replace S slider assy or tension lever.
7)
Recorded & reproduced envelope check
• Records signals in SP & LP modes, using E-180, E-240 tape and playback them to check envelopes.
b
a
c
d
c/a ≧ 0.75
b, d/a ≧ 0.63
(Non S-VHS model)
b, c, d/a ≧ 0.75 (S-VHS model)
8)
Tape damage check
• Run E-240 tape in each mode and check there is no damage at each guide.
9) Checks for Hi-Fi models only.
AFM envelope output max. point check
Playback 3 MHz video signal. 400 Hz AFM signal in alignment tape ST-C7 in SP mode.
Check video envelope max. point (A ch).
Check control pulse phase difference is within ±3 ms from that point to AFM envelope max. point.
Playback mode
Guide roller section damage
Back to step 3) linearity adjustment. (or Slider assembly replacement)
Damage at No.8 guide brush
Back to step 1) ACE head assembly coarse adjustment (or Pinch lever replacement)
Damage at No.1 guide lower flange
Back to step 6) cheek for transitional operation. (or Tension lever replacement)
Review
Damage at No.8 guide flange
Back to step 5) No.9 guide lever check or 1) ACE head assembly coarse adjustment. (Pinch lever, No.9 lever, Capstan motor replacement)
Damage at guide roller section
Back to step 3) linearity adjustment. (or Slider assembly replacement)
Frame advance mode
Damage at No.8 guide flange
Back to step 3) linearity adjustment.
ACE head
Tilt adjusting screw
ACE head position adjusting slit (Insert a slot-type screwdriver.)
ACE height adjusting screw
ACE head position screw
Azimuth adjusting screw
6. ACE HEAD POSITION
• Set tracking at its center position pushing channel (tracking) up/down buttons simultaneously.
• Playback 3 MHz video signal (LP mode) on the alignment tape. Slide ACE main base to obtain max. envelope.
• Playback 3 MHz (A ch) video signal (LP mode) on the alignment tape.
Confirm that difference from tracking center is within 3 ms when maximum envelope is obtained.
• If not, readjust in LP mode.

(3) Tape transport system adjustment

<Pre-adjustment>

When the part(s) listed in Table 7-3-1 is replaced, perform required adjustments by referring to procedures for the tape transport system. When the part(s) listed in Table 7-3-1 is replaced, the tape path may be changed and may damage alignment tape. To prevent this, first run a E-240 tape and make sure excessive tape wrinkle does not occur at each tape guide.

1. If tape wrinkle is observed at the S, T guide rollers, turn the S, T guide rollers until wrinkle disappears.
2. If tape wrinkle is observed at the No. 8 guide, perform the tilt adjustment of the ACE head.

Table 7-3-1

Parts replacement	Adjustment procedure
• Cylinder assembly • S, T sliders • ACE head • Pinch lever assembly • Capstan motor • No. 9 guide lever assembly	From item 1)
• Upper cylinder	From item 2)
• S, T guide rollers • Tension lever assembly • FE head	From item 3)
• Reel clutch assembly • S, T reel tables	From item 4)

<Adjustment procedures>

1) ACE head assembly coarse adjustment

a. Audio head height adjustment

1. Play back the tape recorded in the SP mode. Observe the surface of the ACE head.
2. Turn the ACE height adjusting screw so that upper tape edge matches to the upper edge of the audio head core.

b. ACE head tilt adjustment

1. Play back the tape recorded in the SP mode and observe running condition of the tape at the lower flange of No.8 guide.
2. Turn the ACE tilt adjusting screw until tape wrinkle is caused at the lower flange of No. 8 guide as shown in Fig. 7-3-4 (A).
3. Turn the ACE tilt adjusting screw counterclockwise until the tape travels along the lower flange as shown in Fig. 7-3-4 (B).

c. Audio head azimuth adjustment

1. Play back the 7 kHz audio signal on the alignment tape in the SP mode.
2. Connect a millivoltmeter or oscilloscope to the audio line output terminal.
3. Turn the ACE azimuth adjusting screw to obtain maximum audio output.

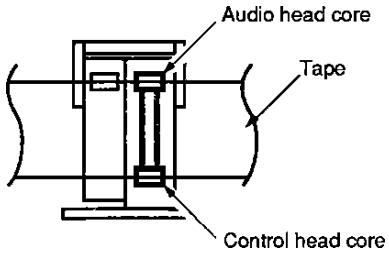


Fig. 7-3-3

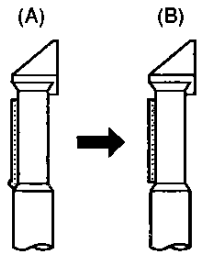


Fig. 7-3-4 No. 8 guide rough adjustment

d. ACE head position adjustment

1. Play back the 2 MHz video envelope signal in the alignment tape in the SP mode. Loosen the ACE head position securing screw.
2. Insert a slot-type screwdriver into the ACE head position adjusting slit on the ACE main base and adjust the ACE main base so that the video envelope reaches a peak level at the tracking center position when the channel (tracking) up/down buttons of VTR are pressed simultaneously.

2) Playback phase adjustment

1. Perform the adjustment according to the methods stated in the electrical adjustment (servo circuit).

3) Linearity adjustment

1. Play back the LP mode 3 MHz video signal on the alignment tape.

Note:

- For models SP mode only, use the 3 MHz (A ch) video siganl in the SP mode.

2. Trigger the scope with the switching pulse to issue the envelope signal output.
3. Make sure the video envelope waveform (in its maximum output) meets the specification shown in Fig. 7-3-5. Again make sure the same by playing back the SP mode 3 MHz video signal on the alignment tape. If not satisfied, adjust as follows:

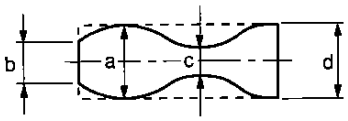
Note:

a = maximum output of the video RF envelope

b = minimum output of the video RF envelope at the entrance side

c = minimum output of the video RF envelope at the center point of cylinder

d = minimum output of the video RF envelop at the exit side of cylinder



c, b, d/a ≧ 0.75 (S-VHS model)

b, d/a ≧ 0.63
c/a ≧ 0.75
} (Non S-VHS model)

Fig. 7-3-5

4. If the (A) section in Fig. 7-3-6 does not meet the specifications, adjust the S guide roller in up or down direction.
5. If the (B) section in Fig. 7-3-6 does not meet the specifications, adjust T guide roller in up or down direction.

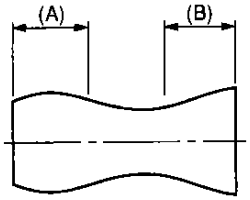


Fig. 7-3-6

6. After completion of the adjustment(s), push the channel (tracking) up/down button and make sure video envelope variations are almost flat.
   Next, play back the 3 MHz SP mode video signal on the alignment tape and makes the video RF envelope variations are also flat when channel (tracking) UP/DOWN buttons is pushed.
7. If the envelope varies like NG figures as shown in Fig. 7-3-7, perform the adjustment again.
   Smooth secondary curves are allowable level.

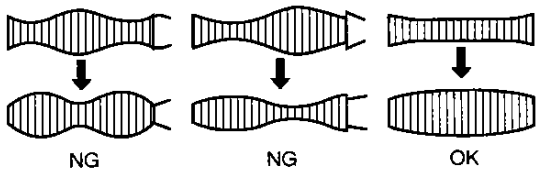


Fig. 7-3-7 Abnormal waveform variation

4) ACE head assembly fine adjustment

a. ACE head height fine adjustment

1. Play back the stereophonic alternative recording 300 – 500 Hz audio signal on the alignment tape.
2. Adjust the ACE height adjusting screw so that the signal envelope is obtained almost flat.

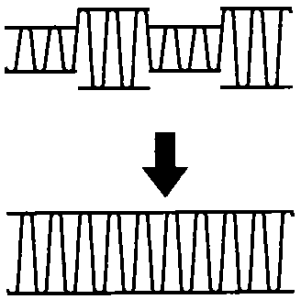


Fig. 7-3-8

Note:

- If there is no alignment tape (ST-C6, ST-C7), do not perform this item "a. ACE head height fine adjustment", and perform the process of the note in item "e. Audio head height check" described later.

b. ACE tilt adjustment

1. Observe the lower flange of No. 8 guide. If any wrinkle is observed, turn the ACE tilt adjusting screw counterclockwise until the wrinkle disappears.
2. If a gap is observed between the lower flange of No. 8 guide and the lower edge of tape, turn the ACE tilt adjusting screw clockwise until the tape travels along the lower flange.

Note:

- This adjustment is performed easily in SP mode playback, double speed playback mode or CUE mode.

c. Audio head height check

1. Play back the stereophonic alternative recorded 300 – 500 Hz audio signal as described in the step 4)-a, and check if the audio envelope is flat. If not, repeat the adjustment described in step 4)-a again.

d. Audio azimuth adjustment

1. Play back the 400 Hz, 7 kHz audio signal on the alignment tape.
2. Turn the ACE azimuth adjusting screw until the maximum audio output is obtained.

e. Audio head hight check

1. Play back the alignment tape desribed in step 4)-a and check if the audio envelope is flat. If not, repeat the adjustment described in step 4)-a.

Note:

- If there is no alignment tape (ST-C6, ST-C7), perform the audio height alignment using the current alignment tape at this adjustment step.

1. Playback the 400 Hz audio signal (SP mode) on the alignment tape.
2. Turn each three alignment screw of the ACE head to the same direction in 45 degrees steps evenly so that the audio output level becomes maximum.
3. Perform the confirmation and adjustment for the tilt and the azimuth again.

f. ACE head postion adjustment

1. Play back the 3 MHz video signal (LP mode) on the alignment tape.
2. Push the channel (tracking) up/down buttons simultaneously and reset the tracking at its center position.
3. Trigger the oscilloscope with the video switching pulse and observe the video envelope waveform.
4. Slide the ACE main base until the maximum envelope output is obtained as described in ACE head position coarse adjustment.
5. Play back the 3 MHz video signal (SP mode) on the alignment tape.
6. Make sure the envelope output is maximum when the tracking control is placed at its center position.

   If no envelope output is obtained with the tracking control set to the center position, again adjust it for maximum envelope output in SP and LP modes. When envelope output is maximum in the LP mode at the tracking center, difference with the case in the SP mode is within 3 ms.
7. Tighten the ACE head position fixing screw and secure the ACE main base.

g. After completion of ACE head fine adjustment, apply screw lock to two screws (tilt, azimuth adjusting screws) in front of the ACE head.

5) No. 9 guide lever adjustment

1. Set the VTR to Cue mode with E-240 tape (at beginning portion) loaded. Switch the Cue mode to the review mode when the tape has been rewound into the T-reel table to some extent.
2. Check tape wrinkle at the upper and lower flange of No. 8 guide. Check the tape does not come off from the flange while running. If the tape comes off from the flange, replace the pinch lever, capstan motor or No. 9 guide lever since the part(s) is (are) defective.

Note:

- Modify the lid of the cassette for the alignment tape E-240 previsously so that the alignment is performed easily.

6) Check for transitional operation from Review to Play, slot-in to play

1. Play back the LP mode white video signal on the alignment tape in Review mode and observe the video envelope with the oscilloscope.
2. Switch the Review mode to the Play mode. When switched to the Play mode, make sure the entrance side envelope comes to an approximate steady state within 3s as shown in Fig. 7-3-9.

If it does not rise within 3s, take the following steps starting 4).

3. Switch the cassette slot-in mode to the Play mode. As in item 2), if it does not rise within 3s, adjust as follows.

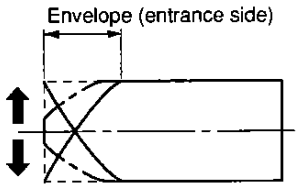


Fig. 7-3-9 Video envelope rising when operation mode is switched from review to play mode

4. Adjust the S guide roller and perform the linearity adjustment again.
5. Check above items 2) and 3) to see that the video envelope rises within 3s. If not, S slider assembly or the tension lever is damaged. Replace either (or both) of them.

Note:

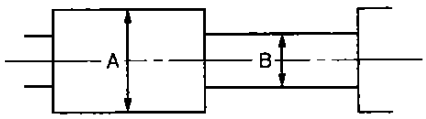
- If the rising characteristic is poor in Review mode, screen noise may occur in synchronous editing recording. Perform the adjustment carefully.

7) Envelope check

1. Make recordings and play back the tapes (E-180 and E-240) in SP and LP modes and make sure the playback output envelope meets the specifications shown in Fig. 7-3-5.
2. In playback the tape (with a E-180), the video envelope should meet the specification as shown in Fig. 7-3-10.

Note:

- Check for both modes, SP and LP. Also check for AFM envelope when using a Hi-Fi model.



- B/A ≧ 0.55
- B ≧ 120mV

Fig. 7-3-10 Envelope output and output difference

3. If the performance does not meet both specifications above 1 and 2 above, replace the upper cylinder assembly.
4. Set the VTR to Rec mode (LP) with the E-180 tape loaded (at the beginning part) and check operation of the synchronous editing recording.
5. If picture noises are observed at the starting position of the editing, perform "6) Check for transitional operation from Review to Play, slot-in to play".

8) Tape wrinkle check

1. Playback the E-240 tape in the normal Play mode, CUE mode, Review mode and the frame advance mode, and check each guide for wrinkle.
2. If excessive tape wrinkle is observed at the mode shown below, perform the associated adjustments also shown below. (The parts described in ( ) may need to replace.)

a. Playback mode

Tape wrinkle at the S, T-guide rollers section

Item 3) Linearity adjustment (Slider assembly)

Tape wrinkle at No. 8 guide flange

Item 1) ACE head assembly coarse adjustment (Pinch roller)

Tape wrinkle at lower flange of No. 1 guide

Item 6) Check for transitional operations from Review to Play, and Slot-In to Play (Tension lever)

b. Review mode

Tape wrinkle at No. 8 guide

Item 1) ACE head assembly coarse adjustment (Pinch lever, No. 9 guide lever, capstan motor)

Tape wrinkle at the guide rollers

Guide roller adjustment (Slider assembly)

c. Frame advance mode

Tape wrinkle at No. 8 guide

Item 3) Linearity adjustment (Pinch lever, capstan motor)

9) Maximum AFM envelope output point check (Hi-Fi model)

1. Playback the SP mode 3 MHz video signal and the 400 Hz AFM signal on the alignment tape.
2. Trigger the oscilloscope with the video switching pulse, adjust the tracking control and check the control pulse phase at the maximum video envelope (A ch) output point.
3. Make sure the control pulse phase difference among each maximum point of AFM envelope, Ach and Bch is within ± 3 ms with the above point used as the basic reference.

Note:

- If the phase difference exceeds 3 ms, replace the upper cylinder.

2. ELECTRICAL ADJUSTMENT

<Test equipment required>

Adjustment will be performed with the following test equipment.

1. Color TV (Monitor)
2. Oscilloscope, 2 CHs, 15 MHz or higher with delay system
3. Frequency counter (7 digits or higher)
4. Millivoltmeter
5. Digital voltmenter
6. Tester (20 kΩ/V)
7. Audio generator
8. Audio attenuator
9. Alignment tapes
   Part code: ST-C6: 70909409, ST-C7: 70909410
10. Alignment screw driver (jig)
11. Color pattern generator
12. Video sweep generator

<Color bar signal>

Color bar signals of 75% recorded on the alignment tapes are shown in Fig. 2-1-1.

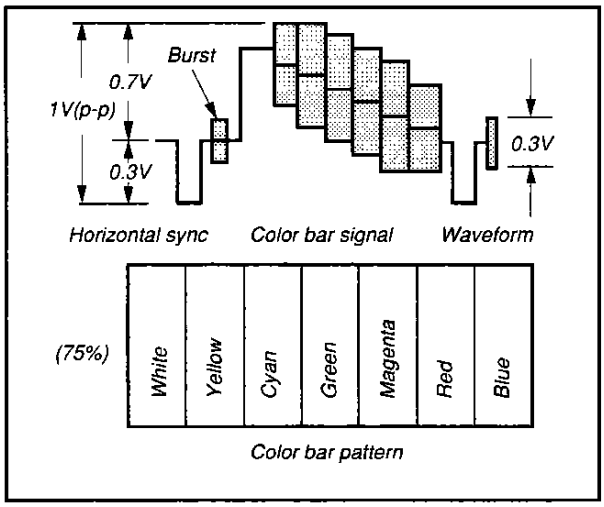


Fig. 2-1-1

<Specified input and output levels, and impedance>

Video input:	Negative sync, standard composite video siganl 1 V(p-p), 75Ω
Video output:	Same as the video input 1 V(p-p), 75Ω
Audio input:	308 mV(rms), more than 47 kΩ
Audio output:	308 mV(rms), less than 4.7 kΩ

<Alignment sequence>

Recorded the alignments in the sequence as shown in Fig. 2-1-2.

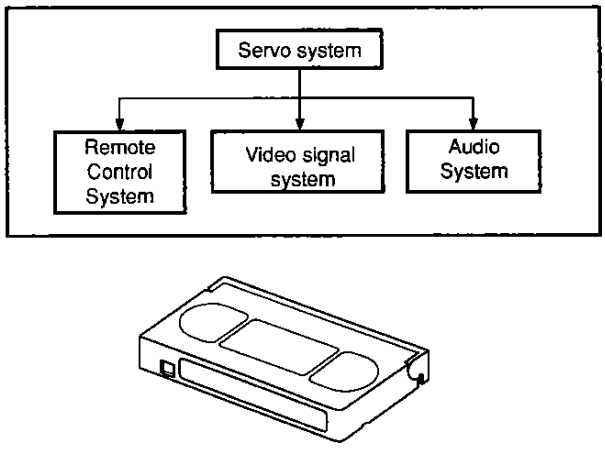


Fig. 2-1-2

Alignment tape specifications

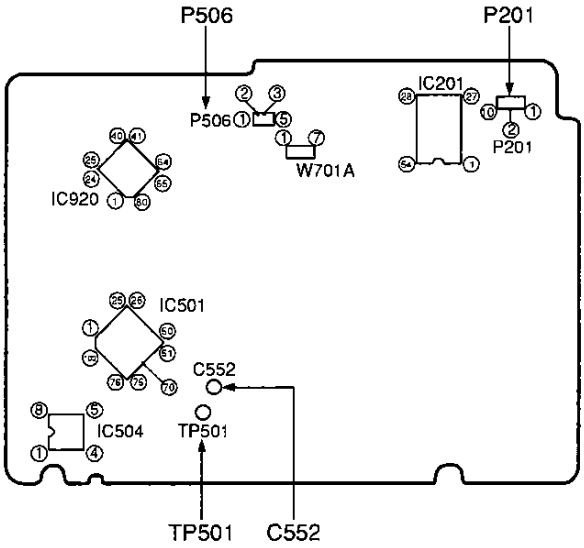
[1] ST-C6

Segment	System	Playback		Video Signal	Audio Signal	Applications
		Time (min)	Mode			
1	PAL & SECAM	10	SP	Mono Scope	1 kHz	Playback phase check, audio level check
2	PAL & SECAM	5	SP	3 MHz A ch	400 Hz and 7 kHz	ACE head position adjustment, ACE head azimuth adjustment, Linearity adjustment
3	PAL & SECAM	5	SP	3 MHz A ch	1 kHz (stereo)	ACE head position adjustment, ACE head height adjustment, Linearity adjustment
4	PAL	5	SP	Color bar	3 kHz	Video and Sound checks
5	SECAM	5	SP	Color bar	3 kHz	Video and Sound checks
6	MESECAM	5	SP	Color bar	3 kHz	Video and Sound checks
7	NTSC	5	SP	Color bar	1 kHz	Video and Sound checks

[2] ST-C7

Segment	System	Playback		Video Signal	Audio Signal	Applications
		Time (min)	Mode			
1	PAL	5	LP	3 MHz A ch	500 Hz (stereo)	ACE head position adjustment, ACE head height adjustment, Linearity adjustment
2	PAL	3	LP	Color bar	3.2 kHz	LP mode operation check, ACE head azimuth check and adjustment
3	PAL	3	SP	Color bar	AFM 400 Hz	SP mode operation check, AFM check
4	PAL & SECAM	5	SP	3 MHz A ch	AFM 400 Hz	AFM tracking checks
5	SECAM	5	LP	3 MHz A ch	No signal	Linearity adjustment
6	SECAM	3	LP	Color bar	No signal	LP mode operation check
7	SECAM	3	SP	Color bar	AFM 400 Hz	SP mode operation check, AFM check

2-1. Servo Circuit



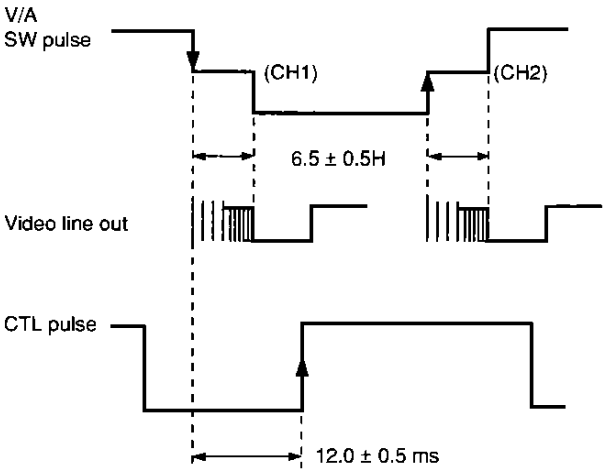
Main PC Board

2-1-1. Playback Phase (PG) Adjustment

Test point: Pins 2 and 3 of P506, Pin 5 of P201 (Video out)

Test equipment: Oscilloscope

1. During playback press the VTR's channel up and down buttons simultaneously to reset to tracking center.
2. Confirm that phase difference between the fall of the SW pulse (pin 3 of P506) and the rise of CTL pulse (pin 2 of P506) is 12 ± 0.5 ms.
3. Further, observe the envelope (pin 5 of P506) waveform, and confirm that the ACE head position adjustment and linearity adjustment have been made, and C-SYNC (pin 70 of IC501) is being input during playback.
4. Set the VTR to the STOP mode.
5. Press the unit's channel up/down buttons simultaneously for more than 5s.
6. Afterwards, within 2s, press the PLAY button on the remote controller.



7. The automatic adjustment will be made for about 10s, all the displays will blink. If the automatic adjustment is not carried out, confirm that the alignment tape has a safety tab or not, and redo from the step 3.
   1) When adjustment has been completed:
      The display will blink for 10s, stop blinking and return to the normal display in the STILL mode, then it shifts to the playback display in the playback mode.
   2) When adjustment fails:
      It goes into the STOP mode.
8. Confirm that the play indicator is displayed, and confirm that the rising and falling edge of the SW pulse is 6.5 ± 0.5H from the V-sync front edge of the video signal.

2-1-2. Pseudo V Adjustment

Test point: TV monitor

Test equipment: Channel up/down buttons

1. Make recordings and playback, and set to the STILL mode.
2. Adjust the main unit's channel up/down buttons so that center of the still screen will stop.

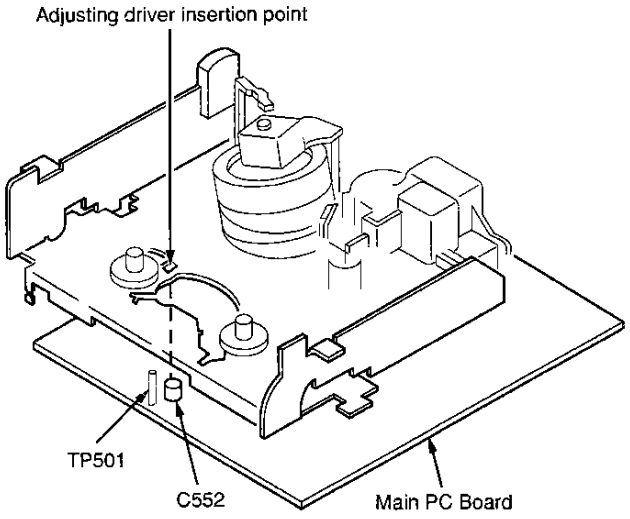
2-1-3. 16 MHz Crystal Oscillation Circuit (Clock) Adjustment

Test point: TP501

Test equipment: Frequency counter

Adjusting point: C552

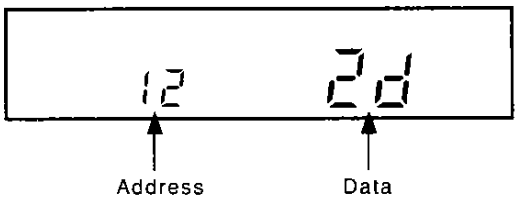
1. Set the unit to power off mode.
2. After pressing the unit's channel up/down buttons simultaneously for more than 5s without loading a cassette, press the FF button on the remote controller within 2s.
3. Connect the frequency counter to TP501 and measure the frequency.
4. Adjust C552 (trimmer capacitor) with adjusting screwdriver so that the adjusting value 8.00002 ± 0.00002 MHz is obtained.
5. The test mode is released when the power turns on and then return to the normal operation mode.



2-1-4. In Case of IC504 is Replaced

When IC504 is replaced, the data in the VTR is required to memorize in the new one. So perform the following procedures.

1. Press the channel up/down buttons on the VTR simultaneously for more than 5s while the display blinks and the unit is in the power off mode.
2. And then within 2s, press the CANCEL button on the remote controller.
3. After displaying the address at the channel display area and the data at the minute display area, set the address to 12 using the channel up/down buttons on the remote controller.
   Next, set the data to 2d using the FF/REW buttons on the remote controller. The data goes up using FF button and down using REW button.



4. Set each address and data in the table below following the description above.

Address	Data
24	0A
25	03
26	15
27	0A

5. Perform the adjustment described in the item "2-1-1. Playback Phase (PG) Adjustment".
6. Pull out the power cord plug from the AC outlet once and insert the power cord plug into the AC outlet again.
7. Perform the channel presetting as the IC504 replaced has no channel data.

2-2. Self Diagnosis Function

2-2-1. Outline

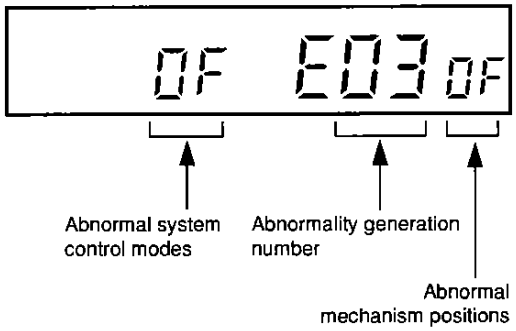
When a tape running stops or the VTR enters the power OFF mode, etc. due to some abnormality, the abnormality is stored in the EEPROM and displayed on the display tube.

2-2-2. Storing abnormal modes

- The abnormality is classed into 5 groups, and the abnormality number, system control mode, and the mechanism position at which the abnormality occurred are stored in the EEPROM.
- The writing timing is just after the abnormality occurred.

2-2-3. Abnormality mode display

- Press the CH UP and CH DOWN buttons on the VTR simultaneously for more than 5s.
- And then within 2s, press the STILL button on the remote control.
- The system control mode at which the abnormality occurred is displayed at the channel display area, "E" is displayed at the hour digit, abnormality generation number is displayed at the minute digit, and the mechanism position is displayed in the second digit position.
- The abnormality mode is displayed regardless of the power on off.



- When the Counter Reset button is pressed in the display period, the abnormality display data is initialized and "-" is displayed.

The data displayed are as follows:

Abnormality generation number

01	Cylinder stop
02	Reel abnormality (take up)
03	Reel abnormality (supply)
04	Abnormal slot in/ slot out
05	Abnormal loading

Abnormal system control modes

00	Standby
01	Stop
02	Rewind
03	Review
04	FF
05	Cue
06	Playback
07	Still, slow playback
08	X2 speed
09	Unloading stop
0A	Reverse playback
0b	Still in reverse playback, Reverse slow playback
0C	Recording
0d	Record pause
0E	Power off eject
0F	Eject
10	Short FF
11	Short REW

Abnormal mechanism positions

01	F/L out
03	F/L down
05	Loading/unloading
07	Reverse rotation with pinch roller ON
09	Playback with pinch roller ON
0b	Stop with main brake ON
0d	FF/REW
0F	Position detection impossible

Positions 0, 2, 4 exist as mechanism positions. For example, 8 shows a position between 7 and 9 (between playback position and review position).

SECTION 3
SERVICING DIAGRAMS

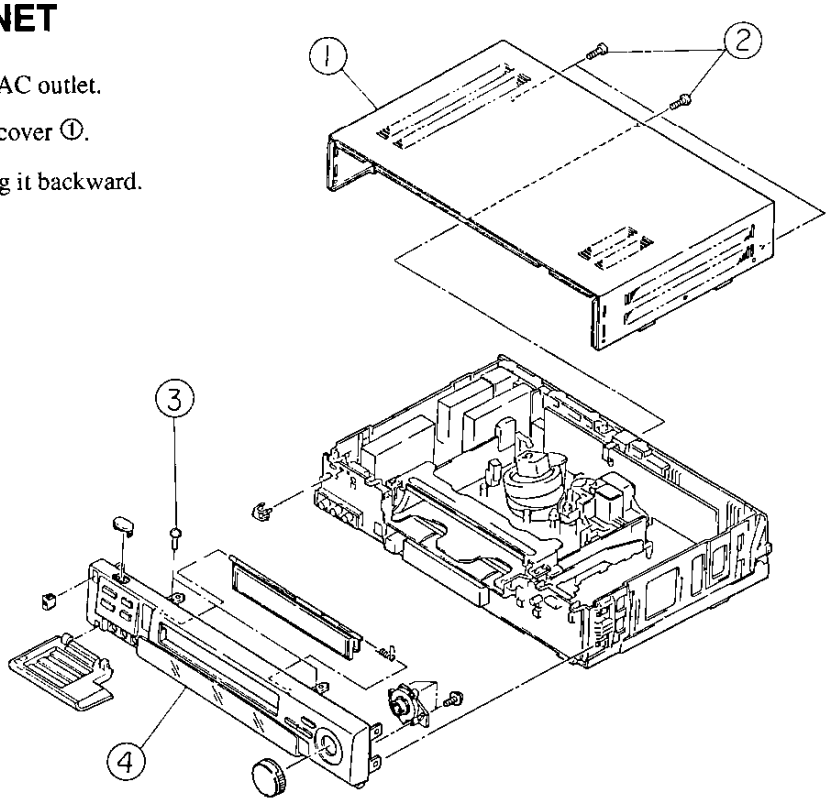
1. INSPECTION PROCEDURE

Operation steps		Items to be confirmed	Inspection block	Page	
				Block Diagram	Circuit Diagram
1. AC Plug-in	Time setting Program timer setting	Clock display Time setting operation	Power (AC system) KDB	3-12 3-15	3-32 3-40
2. Power SW ON	Timer/counter, Memory Channel selection, AFC operation, EE picture & tone quality	Mode display lamp TV receive condition, Channel select operation, AFC operation level, EE picture quality, Tone signal level	Power Logic RF reception Video (EE, REC mode) Audio (EE, REC mode)	3-12 3-19 3-13 3-26 3-29	3-32 3-43 3-34, 37 3-48 3-53
3. Cassette-in and Cassette-out	Cassette-in Cassette loading Eject Casette-out	F/L mechanism operation Cassette loading operation Eject operation Indicator lamp Abnormal sound	Logic	3-19	3-43
4. Key Entry Operation Remote Control	REC, PLAY Cue/Review Still, Frame advance/slow FF/REW	Indicator lamp Each mode operation (Tape drive operation) Abnormal sound	Logic	3-19	3-43
5. Special Functions Counter Functions Tracking	 Linear time counter, Remaining time display, Index/skip search, Time search Digital auto tracking	 Each mode operation Mode operation	 Servo/Logic Servo/Logic	 3-19 3-19	 3-43 3-43
6. Playback Function Picture Sharpness Tone Quality Othres	 PLAY (Test tape: ST-C6, ST-C7) Cue/Review Still/Slow	Resolution, S/N Hue, Saturation, Color unevenness, Color dropout, Sound distortion, Level variation, Picture noise, Jitter Picture swing, Skew distortion, Flicker, Beat	Video PLAY system Audio PLAY system Servo system	3-26 3-29 3-19	3-48 3-53 3-43
7. REC/PLAY Functions Picture Sharpness Tone Quality Others	 REC/PLAY	Resolution, S/N Hue, Saturation, Color unevenness, Color dropout, Sound distortion, Level variation, Picture noise, Jitter Picture swing, Skew distortion, Flicker, Beat	Video PLAY system Audio PLAY system Servo system	3-26 3-29 3-19	3-48 3-53 3-43

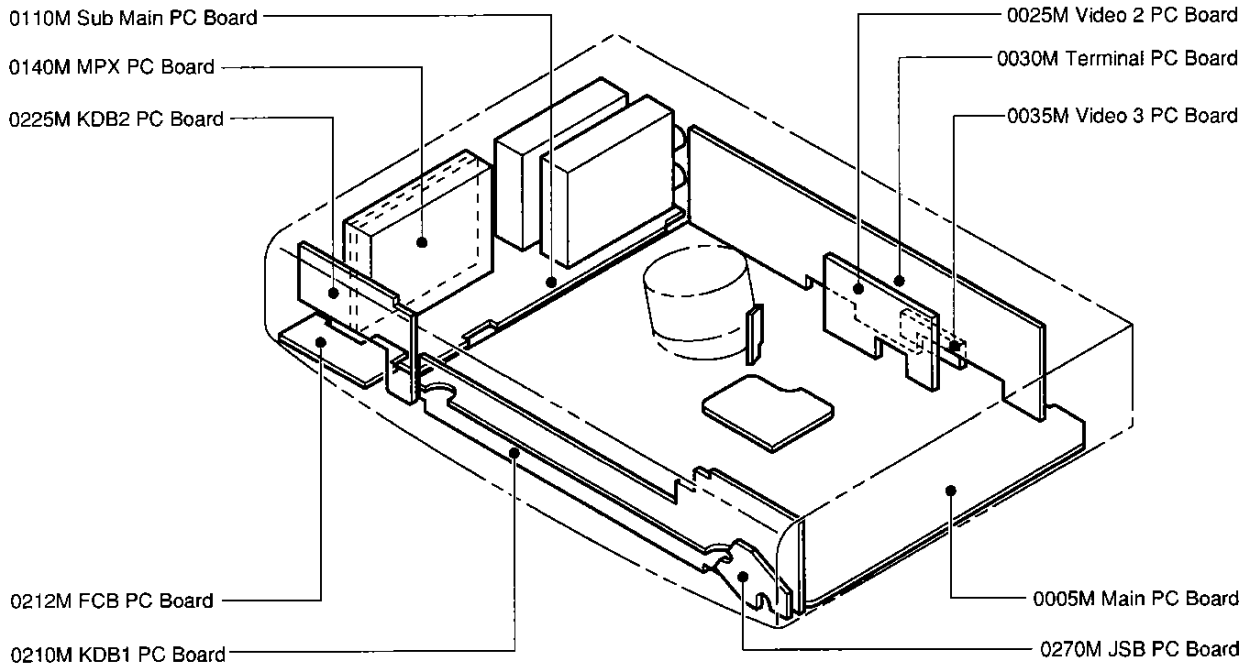
How to use the table
1. When inspecting a defective VTR, proceed according to the steps shown in the table.
2. Check the items to be confirmed for each operation step.
3. If a problem is found on the item, check waveforms (level) referring to the block diagram relating to the items.
4. Use PC board pattern diagram and schematic diagram to examine the circuit precisely.

2. REMOVAL OF CABINET

1. Disconnect power cord plug from AC outlet.
2. Remove 3 screws ② securing top cover ①.
3. Remove the top cover ① by sliding it backward.
4. Remove 2 screws ③.
5. Remove the front panel ④.



3. ELECTRICAL UNITS LOCATION DIAGRAM


0110M Sub Main PC Board
0140M MPX PC Board
0225M KDB2 PC Board
0212M FCB PC Board
0210M KDB1 PC Board
0025M Video 2 PC Board
0030M Terminal PC Board
0035M Video 3 PC Board
0005M Main PC Board
0270M JSB PC Board

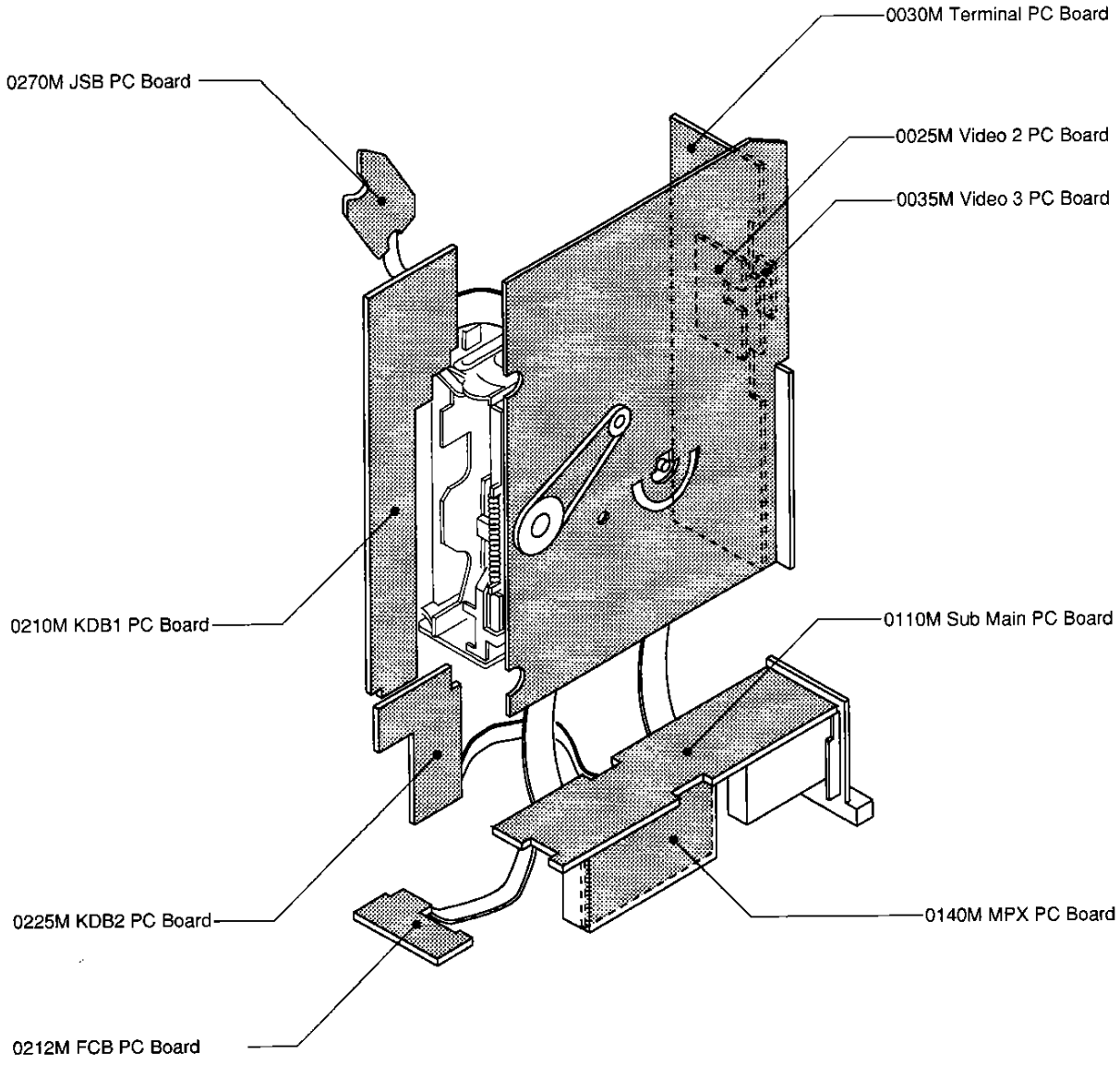
4. STANDING PC BOARDS FOR SERVICING

After removing the mechanical deck with the main PC board, place the mechanical deck to upright. Then perform servicing in the condition that all the units are connected each other.

Note:

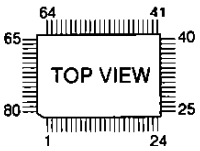
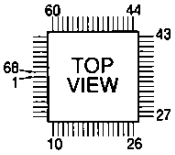
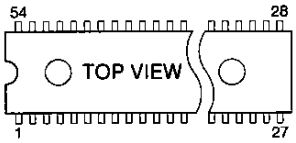
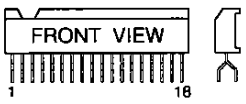
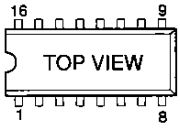
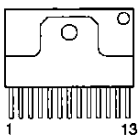
Applying an excessive force to the connector connecting KDB1 and KDB2 PC board will damage the connector.

So, take much care when removeing them.


0030M Terminal PC Board
0270M JSB PC Board
0025M Video 2 PC Board
0035M Video 3 PC Board
0210M KDB1 PC Board
0110M Sub Main PC Board
0225M KDB2 PC Board
0140M MPX PC Board
0212M FCB PC Board

5. PART CONFIGURATION AND THEIR SYMBOLS

1.ICs

NAME	SHAPE
TA8863AF	
MSP3410	
TA8892AN	
TA8894AF	
STV6400	
TA1205N	
BA7025L	
TB6515AP TL8843P	
LA5611	

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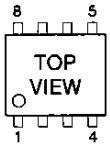
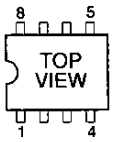
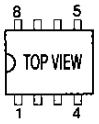
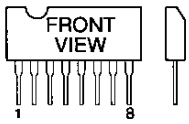
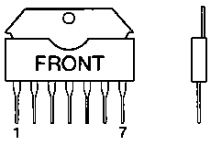
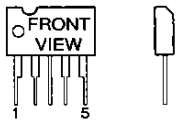
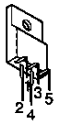
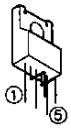
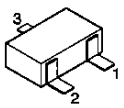
M5218AP	
TL8844P TL8828P	
ST24C04	
BA7611AN	
TA7267BP	
BA7755	
PQ12RF1	
STR-D6802	
PQ05SZ11	

NAME	SHAPE
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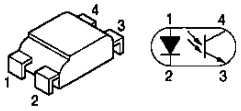
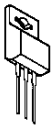
PC120FY2	
AN7805	
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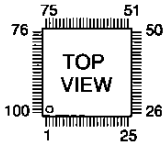
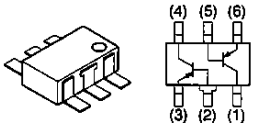
TMP90CR74DF-7398	

2.TRANSISTORs

NAME	SHAPE
2SC1959-Y	
2SA1020-Y 2SC2236-Y(C)	
IMX1	

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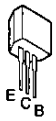
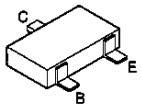
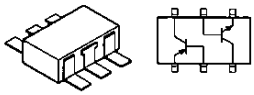
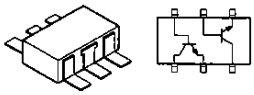
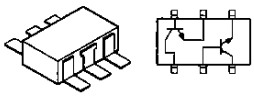
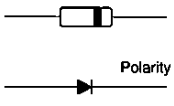
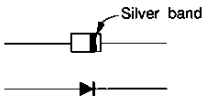
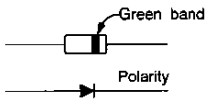
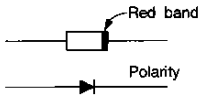
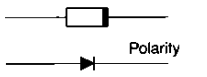
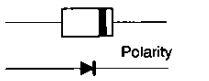
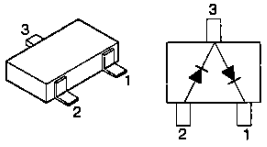
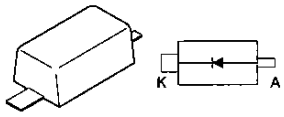
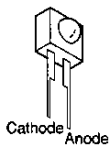
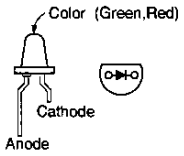
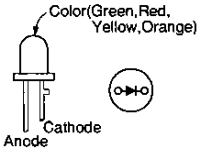
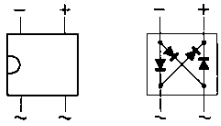
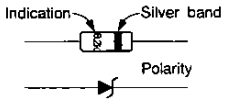
KTA1273	
KTD2092	
DTC114EK,2SC2712-Y 2SC2411KQ,2SA1162-Y RN2402 RN1401 RN1402 RN1404	
IMZ1	
IMX3	
IMH6	
PT493F	

3.DIODEs

NAME	SHAPE
1N4148 ZPD5V1 1SS136 ZPD15	

NAME	SHAPE
EL1Z	
1SS176	
ERA15-02	
ZTK33B RU2YX	
RU1P RU4Z	
AG01	
1SS184	
MA111	
GL451V	

NAME	SHAPE
TLUG163	
SE303AC TLO113A	
S1WBA60	
MTZJ7.5B	

5-1. Replacing Subminiature "CHIP" Parts

5-1-1. Required Tools:

1. Fine tipped, well insulated soldering "pencil", about 30 Watts.
2. Tweezers.
3. Blower type hair dryer.

5-1-2. Soldering Cautions:

1. Do not apply heat for more than 3s.
2. Avoid using a rubbing stroke when soldering.
3. Discard removed chips; do no reuse them.
4. Supplementary cementing is not required.
5. Use care not to scratch or otherwise damage the chips.

5-1-3. Removal (Resistors, Capacitors, etc.):

1. Melt the solder at one side.

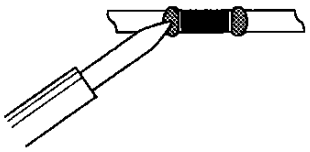


Fig. 1

2. Grasp the part with tweezers and melt the solder at the other side.

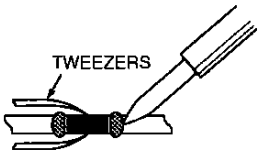


Fig. 2

3. Remove the part with a twisting motion.

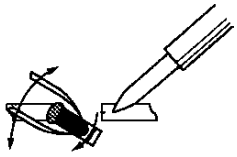


Fig. 3

5-1-4. Removal (Transistors, Diodes, etc.):

1. Melt the solder of one lead.

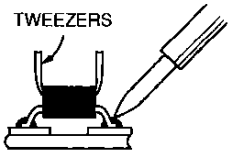


Fig. 4

2. Lift the side of that lead upward.

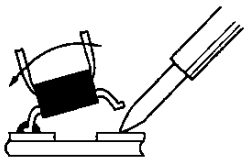


Fig. 5

3. Simultaneously heat solder the two remaining leads and lift part to remove.

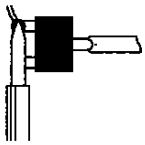


Fig. 6

5-1-5. Preheating (Except for semiconductors):

Immediately before installing new resistors or capacitors, use a blower type hair dryer and preheat the part for about two min. at approximately 150°C.

5-1-6. Replacement:

1. Presolder the contact points of the circuit pattern.

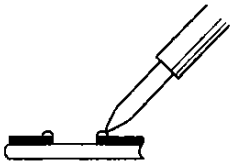


Fig. 7

2. Press the part downward with tweezers and apply the soldering pencil as indicated in the figure.

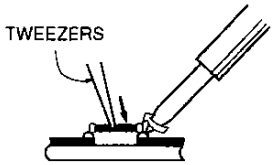


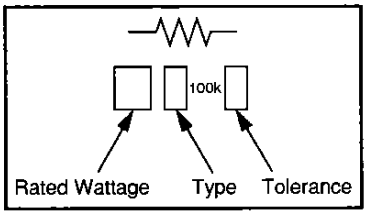
Fig. 8

5-2. Precautions for Part Replacement

- In the schematic diagram, parts marked ⚠ (ex. ⚠ F801) are critical part to meet the safety regulations, so always use the parts bearing specified part codes (SN) when replacing them.
- Using the parts other than those specified shall violate the regulations, and may cause troubles such as operation failures, fire etc.

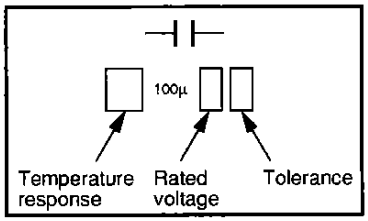
5-3. Solid Resistor Indication

Unit	None .....Ω k .....kΩ M .....MΩ
Tolerance	None .....±5% B .....±0.1% C .....±0.25% D .....±0.5% E .....±1% G .....±2% K .....±10% M .....±20%
Rated Wattage	(1) Chip Parts None ..... 1/16W (2) Other Parts None ..... 1/6W Other than above, described in the Circuit Diagram.
Type	None .....Carbon film S .....Solid R .....Oxide metal film W .....Metal film W .....Cement FR .....Fusible



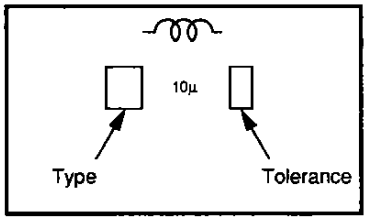
5-4. Capacitance Indication

Symbol	.....Electrolytic, Special electrolytic .....Non polarity electrolytic .....Ceramic, plastic .....Film .....Trimmer
Unit	None .....F μ .....μF p .....pF
Rated voltage	None .....50V For other than 50V and electrolytic capacitors, described in the Circuit Diagram.
Tolerance	(1) Ceramic, plastic, and film capacitors of which capacitance are more than 10 pF. None .....±5% or more B .....±0.1% C .....±0.25% D .....±0.5% F .....±1% G .....±2% (2) Ceramic, plastic, and film capacitors of which capacitance are 10 pF or less. None .....more than ±5% pF B .....±0.1 pF C .....±0.25 pF (3) Electrolytic, Trimmer Tolerance is not described.
Temperature characteristic (Ceramic capacitor)	None .....SL For others, temperature characteristics are described. (For capacitors of 0.01 μF and no indications are described as F.)



5-5. Inductor Indication

Unit	None ..... H μ ..... μH m ..... mH
Tolerance	None ..... ±5% B ..... ±0.1% C ..... ±0.25% D ..... ±0.5% F ..... ±1% G ..... ±2% K ..... ±10% M ..... ±20%
Type	PL ..... Peaking For other, model name is described.



5-6. Waveform and Voltage Measurement

- Measurement of waveform and voltage at each section in the color circuits was conducted with sufficient service color bar signal being received and reproduced in normal conditions.
- Waveforms and voltage values for the remaining circuit were measured with a broadcasting signal normally received, so they may vary slightly according to the programs being received. Use them as a measure for servicing.
- All voltage values except the waveforms are expressed in DC and measured by a digital voltmeter.

5-7. Chip Part Replacement

(Use spare part with wire leads connected.)

1. Hold a Chip part to be removed with tweezers and apply heat to the solder at one end of the part with a soldering iron. (Fig. 9)

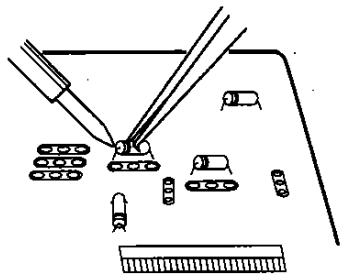


Fig. 9

2. Apply heat to the solder at the other end of the part and remove it.

   The heating time should be as short as possible so the excessive heat is not applied to foil patterns and the PC Board.

3. If it is difficult to remove the part, temporarily stop the desoldering job and wait until temperature of the part lowers.

   Then, repeat steps 1 and 2.

4. Form leads of the replacement part (general part equivalent to the chip part) as shown in the figures and solder place. (Fig. 10)

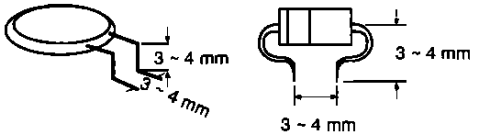


Fig. 10

5. Mount the replacement part so that it does not touch any other parts. (Fig. 11)

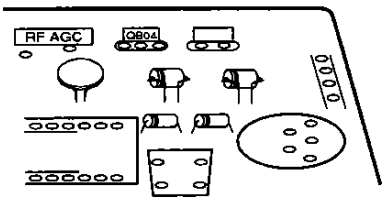


Fig. 11

SECTION 4
PARTS LIST

SAFETY PRECAUTION

The parts identified by ⚠ mark are critical for safety. Replace only with part number specified.

The mounting position of replacement is to be identical with originals.

The substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create shock, fire or other hazards.

NOTICE

The part number must be used when ordering parts in order to assist in processing, be sure to include the model number and description.

Parts marked # are of chip type and mounted on original PC boards.

However, when they are placed for servicing works, use discrete parts listed on the parts list.

ABBREVIATIONS

1. **Integrated circuit (IC)**
2. **Capacitor (Cap)**
   - **Capacitance Tolerance (for Nominal Capacitance more than 10pF)**

Symbol	B	C	D	F	G	J	K	M	N
Tolerance %	±0.1	±0.25	±0.5	±1	±2	±5	±10	±20	±30

Symbol	P	Q	T	U	V	W	X	Y	Z
Tolerance %	+100 0	+30 −10	+50 −10	+75 −10	+20 −10	+100 −10	+40 −20	+150 −10	+80 −20

Ex. 10μF J = 10μF ± 5%

   - **Capacitance Tolerance (for Nominal Capacitance 10pF or less)**

Symbol	B	C	D	F	G
Tolerance pF	±0.1	±0.25	±0.5	±1	±2

Ex. 10pF G = 10pF ± 2pF

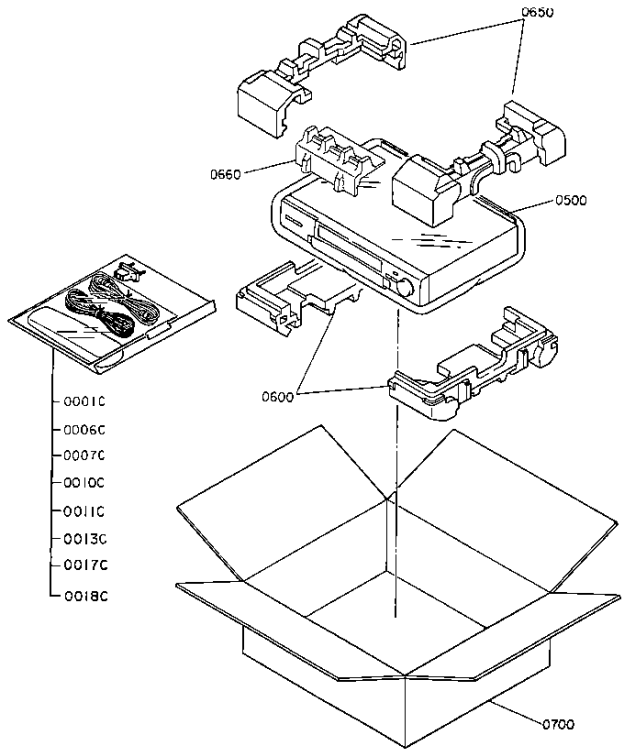
3. **Resistor (Res)**
   - **Resistance tolerance**

Symbol	B	C	D	F	G	J	K	M
Tolerance %	±0.1	±0.25	±0.5	±1	±2	±5	±10	±20

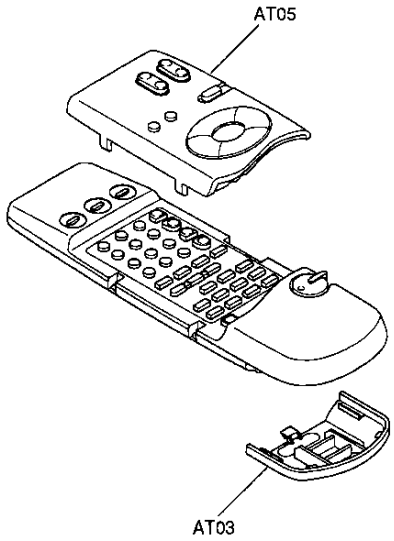
Ex. 470 Ω J = 470Ω ± 5%

4. EXPLODED VIEWS

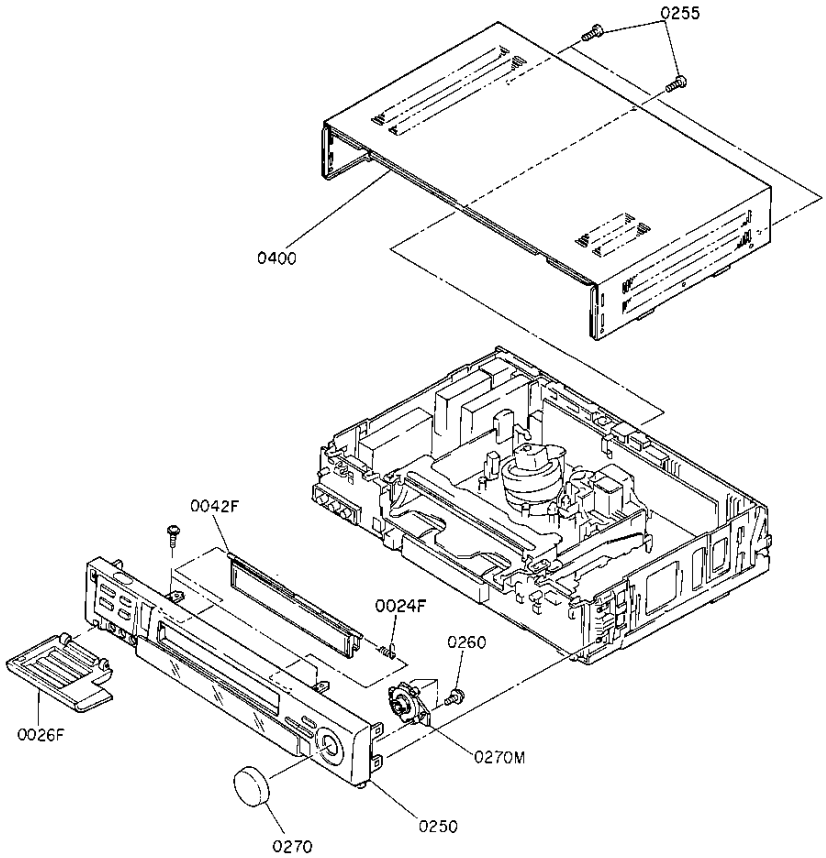
4-1. Packing Assembly



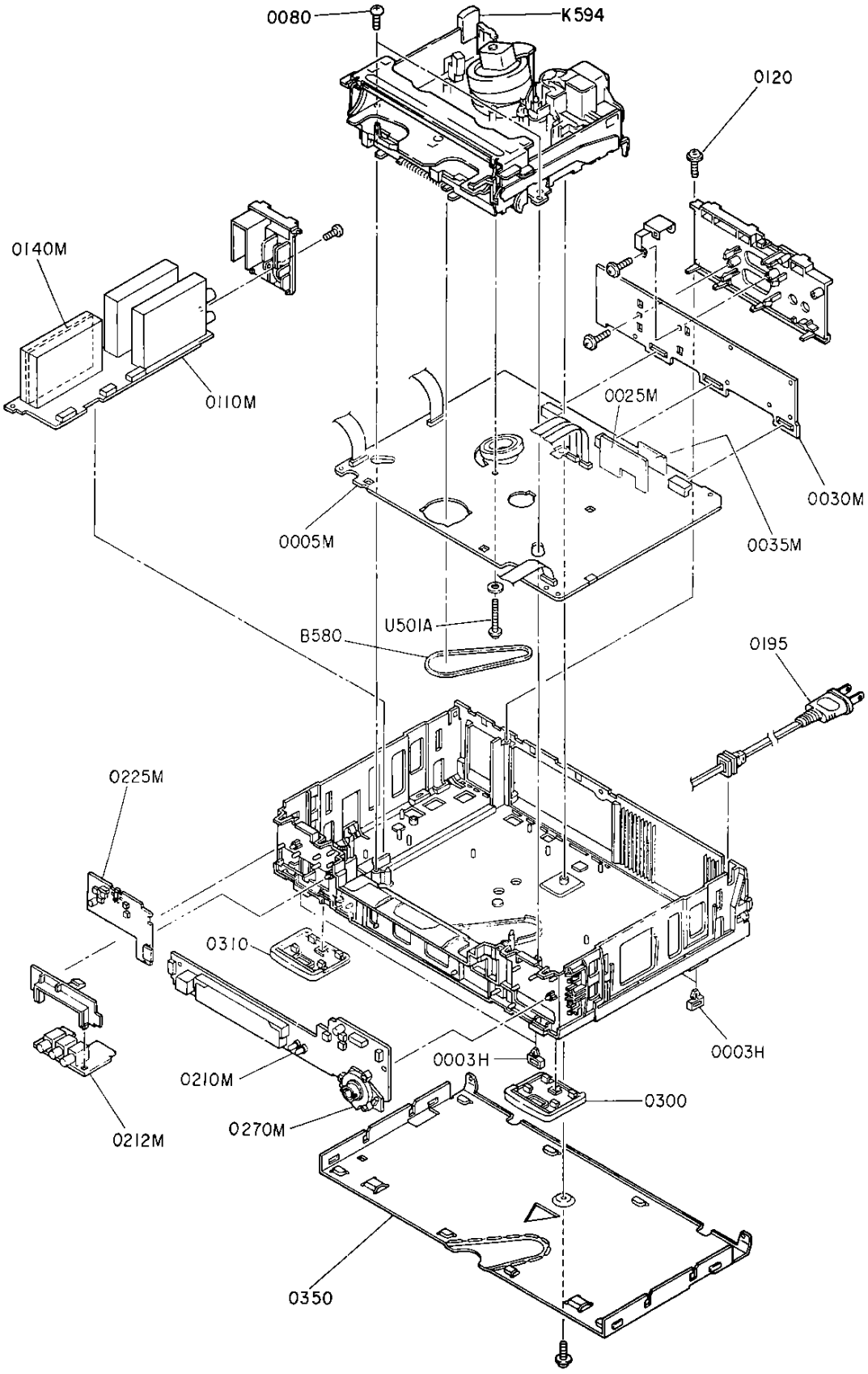
4-2. Remote Control Unit



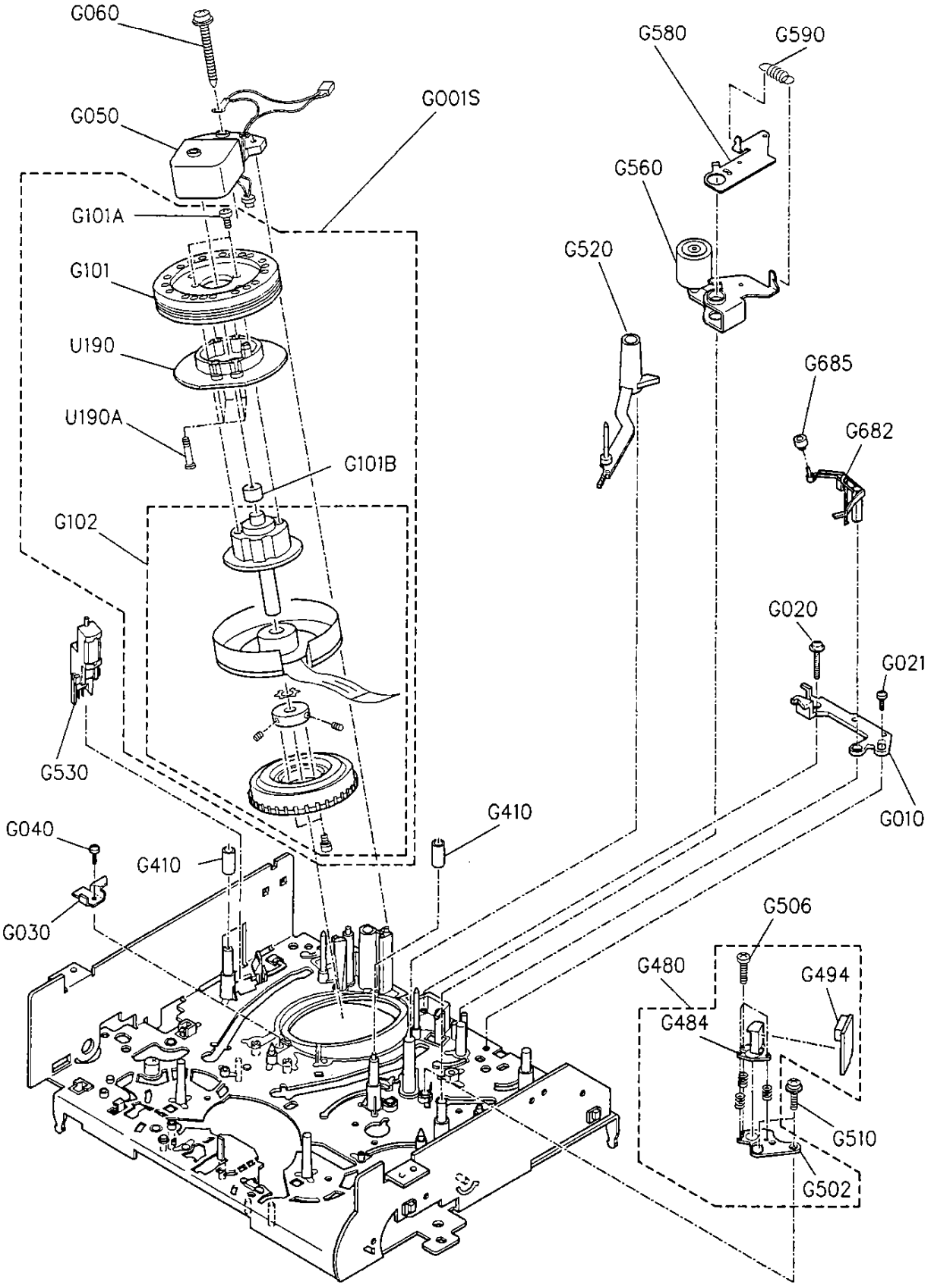
4-3. Cabinet Assembly



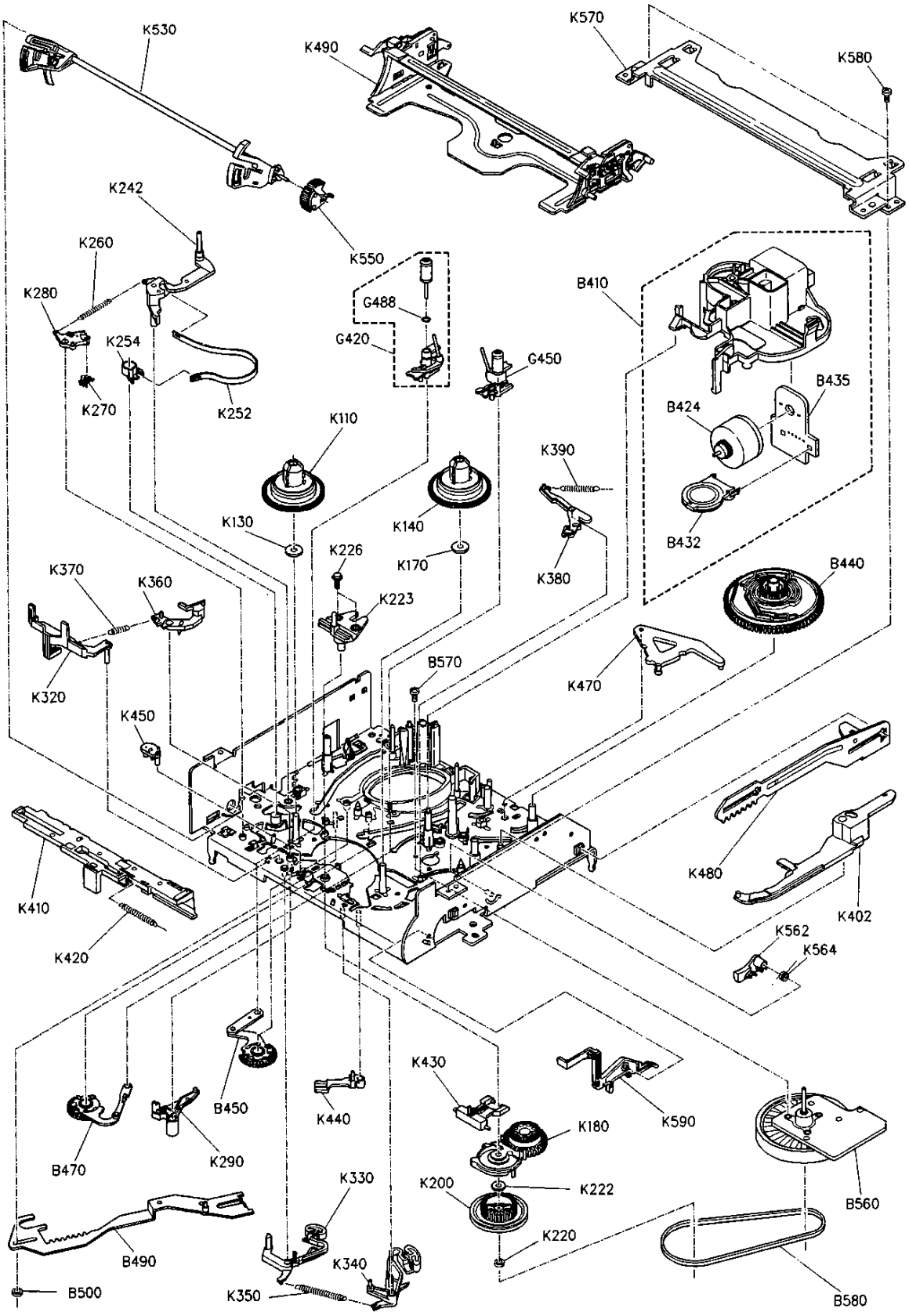
4-4. Chassis Assembly



4-5. Mechanism Assembly (1)



4-6. Mechanism Assembly (2)



5. PARTS LIST

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
		- MECHANICAL PARTS -	
0001C	70061248	Owners Manual	English/Arabic
0006C	70060040	Cover	
0007C	70061214	Sheet(RF)	
0010C	70012161	Remote Control Unit	
0013C	70011442	Cable	
0017C	23122780	AC Adaptor	
0018C	70051479	Antenna Adaptor	
0024F	70051218	Spring	
0026F	70051447	Door	
0042F	70051497	Cassette Door	
0120	72471082	Screw, 3x10mm	
⚠0195	70012277	Power Cord	
⚠0250	70051482	Front Panel	
0255	72471082	Screw, 3x10mm	
0260	72471082	Screw, 3x10mm	
0270	70051199	Knob	
0300	70051208	Insulator	
0310	70051209	Insulator	
0400	70051181	Top Cover	
0600	70060997	Packing(Bottom)	
0650	70060998	Packing(Top)	
0700	70061307	Case	
AT03	70108952	Case, Battery	
AT05	70107049	Cover	
B410	70031394	Loading Drive Assy	
B424	70031396	Loading Motor Sub Assy	
B432	70031401	Cam Switch	
B435	70031402	Loading Drive Unit	
B440	70051147	Cam Gear	
B450	70031404	S Loading Assy	
B470	70031408	T Loading Assy	
B490	70031412	Loading Slider Assy	
B560	70031498	Capstan Motor Assy	
B570	70070028	Screw	2.6x6mm
B580	70031442	Reel Belt	
G001S	70031646	Cylinder Assy	
G010	70031444	Plate(Cylinder)	
G020	70031643	Screw	2.6x5mm
G021	70031644	Screw	2.6x5mm
G030	70031445	Plate(Cylinder)	
G040	70031644	Screw	2.6x5mm
G050	70031451	Slip Ring Assy	
G060	70031449	Screw	
G101	70031645	Upper Cylinder Assy	
G101A	70031521	Screw	
G101B	70031523	Coupling	
G102	70031526	Lower Cylinder Assy	
G410	70031348	Guide Sleeve	
G420	70031349	S Slider Assy	
G448	70031505	O Ring	
G450	70031360	T Slider Assy	
G480	70031512	ACE Head Assy	
G484	70031511	ACE Sub Base Assy	
G504	70031508	Spring	
G520	70031370	No.9 Guide Lever Assy	
G530	70031443	FE Head	
G560	70031384	Pinch Lever Assy	
G580	70031390	Pinch Drive Assy	
G590	70031392	Spring	
G610	70031661	Inpedance Roller	
G680	70031493	Cleaner Lever Assy	
K110	70031328	S Reel Assy	
K130	70031334	Washer	
K140	70031335	T Reel Assy	
K170	70031334	Washer	
K180	70031339	Idle Arm Assy	
K200	70031345	Center Gear Pully	
K220	70031503	Washer	
K222	70031527	Washer	
K242	70031374	Tension Lever Sub Assy	
K252	70031376	Band Brake Sub Assy	
K254	70031377	Band Holder	
K260	70031660	Spring	
K270	70031379	Hook Lever	
K280	70031380	Hook Lever	
K290	70031381	Tension Drive Lever	
K320	70031466	Rec Inhibit Lever	
K330	70031420	S Main Brake Assy	
K340	70031421	T Main Brake Assy	
K350	70031422	Spring	
K360	70031469	S Soft Brake Lever	
K370	70031423	Spring	
K380	70031424	T Soft Brake Assy	
K390	70031426	Spring	
K402	70031471	Drive Lever	
K410	70031427	Cam Slider	
K420	70031428	Spring	
K430	70031472	Idle Up Down Lever	
K440	70031473	Idle Kick Lever	
K450	70031476	Idle Centering Lever	
K470	70031477	Cam Lever	
K480	70031430	FL Drive Slider	
K490	70031431	Cassette Holder Assy	
K530	70031415	Drive Arm Assy	
K550	70051150	Drive Lever Gear	
K562	70031482	Arm Brake Lever	
K564	70031440	Spring	
K570	70031441	Top Bracket	
K590	70031483	Door Open Lever	
U190	70090732	P C Board Assy	Pre-amp
U190A	70031520	Screw	

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
		- ELECTRICAL PARTS -	
■0005M	70090759	P C Board Assy	Main
		- INTEGRATED CIRCUITS -	
IC101	70011942	IC	TA8894AF
IC201	70012217	IC	TA8892AN
IC264	70012118	IC	IMZ1
IC416	70012107	IC	IMH6
IC418	70012107	IC	IMH6
IC471	70012231	IC	TA1205N
IC481	70012119	IC	IMX3
IC501	70012275	IC	TMP90CR74DF-7398(Z
IC502	70011801	IC	TA7267BP
IC503	70011887	IC	TB6515AP
IC504	70011892	IC	ST24C04
IC505	70011808	IC	PST7032MT
IC598	70011613	IC	AN7805
IC599	70011893	IC	PST7045MT
IC701	70011806	IC	BA7755
IC803	70011905	IC	STR-D6802
IC821	70011803	IC	LA5611
IC920	70011898	IC	TA8863AF
Q823	70011901	IC	PQ12RF1
		- TRANSISTORS -	
Q211	A6335470	Transistor, Chip	2SC2712-Y
Q212	A6541130	Transistor, Chip	2SA1162-Y
Q213	A6335470	Transistor, Chip	2SC2712-Y
Q214	A6541130	Transistor, Chip	2SA1162-Y
Q215	A6541130	Transistor, Chip	2SA1162-Y
Q261	A6541130	Transistor, Chip	2SA1162-Y
Q262	A6004040	Transistor, Chip	RN1404
Q263	A6335470	Transistor, Chip	2SC2712-Y
Q291	A6004040	Transistor, Chip	RN1404
Q292	A6004040	Transistor, Chip	RN1404
Q410	A6335470	Transistor, Chip	2SC2712-Y
Q417	A6004040	Transistor, Chip	RN1404
Q423	A6004040	Transistor, Chip	RN1404
Q424	A6335470	Transistor, Chip	2SC2712-Y
Q438	A6335470	Transistor, Chip	2SC2712-Y
Q439	A6004040	Transistor, Chip	RN1404
Q472	A6335470	Transistor, Chip	2SC2712-Y
Q499	A6004020	Transistor, Chip	RN1402
Q506	70011581	Transistor, Chip	DTC114EK
Q507	70011581	Transistor, Chip	DTC114EK
Q508	70011386	Transistor	2SA1020-Y
Q509	70011386	Transistor	2SA1020-Y
Q510	A6004010	Transistor, Chip	RN1401
Q511	A6004010	Transistor, Chip	RN1401
Q513	A6541130	Transistor, Chip	2SA1162-Y
Q771	A6319311	Transistor	2SC1959-Y
Q772	70011787	Transistor, Chip	2SC2411KQ
Q773	70011787	Transistor, Chip	2SC2411KQ
⚠Q802	70011877	Photo coupler	PC120FY2
Q822	70012031	Transistor	KTD2092
Q974	A6541130	Transistor, Chip	2SA1162-Y
QI01	70012253	Transistor	PT493F
QI02	70012253	Transistor	PT493F
QI03	A6335470	Transistor, Chip	2SC2712-Y
QI04	A6335470	Transistor, Chip	2SC2712-Y
QI05	A6335470	Transistor, Chip	2SC2712-Y
		- DIODES -	
D081	70010628	Diode, Zener	ZTK33B
D503	70010153	Diode	1N4148
D507	23118486	Diode	ERA15-02
D508	23118486	Diode	ERA15-02
D509	70012002	Diode, Zener	MTZJ7.5B
D512	23118486	Diode	ERA15-02
D596	A7160570	Diode	1SS176
D597	23118486	Diode	ERA15-02
⚠D803	70011880	Diode	S1WBA60
D805	70011483	Diode	AG01
D806	70011482	Diode	RU1P
D807	23118486	Diode	ERA15-02

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
D808	70011488	Diode, Zener	ZPD5V1
⚠D821	70011873	Diode	RU4Z
⚠D822	70011790	Diode	RU2YX
D823	70011789	Diode	1SS136
⚠D824	70011481	Diode	EL1Z
D891	A7160570	Diode	1SS176
D901	A7150650	Diode	1SS184
D930	70011874	Diode, Zener	ZPD15
D931	70011874	Diode, Zener	ZPD15
DI01	70010180	Diode, LED	GL451V
		- COILS -	
L101	70011775	Coil, Peaking	
L104	70011850	Coil, Peaking	
L105	70012110	Coil, Peaking	
L106	70041093	Chip Jumper	
L202	23238703	Coil, Peaking	TRF4820AJ
L203	23238704	Coil, Peaking	TRF4680AJ
L204	70011851	Coil, Peaking	
L207	70011774	Coil, Peaking	
L208	70011776	Coil, Peaking	
L209	70012112	Coil, Peaking	
L402	70012112	Coil, Peaking	
L472	23238714	Coil, Peaking	TRF4100AJ
L473	70012054	Coil, Peaking	
L474	23237975	Coil, Peaking	TRF4101AC
L505	23238710	Coil, Peaking	TRF4220AJ
L506	70011459	Coil, Peaking	
L507	70011459	Coil, Peaking	
L508	23238710	Coil, Peaking	TRF4220AJ
L520	70011459	Coil, Peaking	
L581	70012113	Coil, Peaking	
L701	23237729	Coil, Peaking	TRF4822AP
L771	70011767	Coil	TLN1088D
L775	70011852	Coil, Peaking	
L821	70011455	Coil, Choke	
L822	70011455	Coil, Choke	
L823	23238653	Coil, Peaking	TRF4470AI
L825	70011455	Coil, Choke	
L975	70011851	Coil, Peaking	
		- CAPACITORS -	
C101	24814103	Cap, Chip	0.01μF Z 50V
C102	24814103	Cap, Chip	0.01μF Z 50V
C103	24814103	Cap, Chip	0.01μF Z 50V
C104	24783390	Cap, Chip	39pF J 50V
C105	70041300	Cap, Electrolytic	0.47F M 50V
C106	70041038	Cap, Electrolytic	10μF M 16V
C107	70041328	Cap, Chip	100nF Z 25V
C108	70041298	Cap, Electrolytic	1μF M 50V
C109	70041596	Cap, Chip	10nF K 50V
C110	24285103	Cap, Chip	0.01μF K 50V
C111	70041314	Cap, Electrolytic	47μF M 6.3V
C112	70041562	Cap, Chip	100nF Z 50V
C113	24092178	Cap, Chip	0.1μF K 25V
C114	70041596	Cap, Chip	10nF K 50V
C115	70041863	Cap, Chip	560pF J 50V
C117	24815102	Cap, Chip	1000pF K 50V
C118	70041528	Cap, OS	1μF M 16V
C120	24783270	Cap, Chip	27pF J 50V
C121	24287103	Cap, Chip	0.01μF Z 50V
C122	70041118	Cap, Chip	220pF J 50V
C201	24092178	Cap, Chip	0.1μF K 25V
C202	24783221	Cap, Chip	220pF J 50V
C204	70041038	Cap, Electrolytic	10μF M 16V
C205	24814103	Cap, Chip	0.01μF Z 50V
C206	70041570	Cap, Electrolytic	100μF M 10V
C207	70041328	Cap, Chip	100nF Z 25V
C208	24783390	Cap, Chip	39pF J 50V
C209	24783680	Cap, Chip	68pF J 50V
C210	70041863	Cap, Chip	560pF J 50V
C212	70041764	Cap, Chip	180pF J 50V
C213	70041328	Cap, Chip	100nF Z 25V
C214	24206010	Cap, Electrolytic	1μF M 50V
C215	70041298	Cap, Electrolytic	1μF M 50V
C216	70041298	Cap, Electrolytic	1μF M 50V
C217	70041038	Cap, Electrolytic	10μF M 16V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
C218	24203100	Cap, Electrolytic	10μF	M 16V
C219	70041053	Cap, Electrolytic	4.7μF	M 35V
C221	70041328	Cap, Chip	100nF	Z 25V
C222	70041570	Cap, Electrolytic	100μF	M 10V
C224	70041914	Cap, OS	47μF	M
C225	24783101	Cap, Chip	100pF	J 50V
C226	24092178	Cap, Chip	0.1μF	K 25V
C227	70041326	Cap, Chip	56pF	J 50V
C261	70041328	Cap, Chip	100nF	Z 25V
C262	24774180	Cap, Chip	18pF	J 50V
C263	70041596	Cap, Chip	10nF	K 50V
C266	70040239	Cap, Ceramic, Chip	18pF	J 50V
C267	24783470	Cap, Chip	47pF	J 50V
C401	70041298	Cap, Electrolytic	1μF	M 50V
C402	70041530	Cap, Chip	330nF	Z 16V
C403	70041302	Cap, Electrolytic	22μF	M 6.3V
C404	24815153	Cap, Chip	0.015μF	K 50V
C405	24774150	Cap, Chip	15pF	J 50V
C406	24815102	Cap, Chip	1000pF	K 50V
C407	70041504	Cap, Electrolytic	470nF	M 50V
C408	24814103	Cap, Chip	0.01μF	Z 50V
C409	24814103	Cap, Chip	0.01μF	Z 50V
C410	24781300	Cap, Chip	30pF	J 50V
C411	70041314	Cap, Electrolytic	47μF	M 6.3V
C412	70041328	Cap, Chip	100nF	Z 25V
C413	70041503	Cap, Electrolytic	100nF	M 50V
C414	24815153	Cap, Chip	0.015μF	K 50V
C415	70041156	Cap, Chip	330nF	Z 25V
C416	24814103	Cap, Chip	0.01μF	Z 50V
C417	70040873	Cap, Plastic	82nF	J 63V
C419	24814103	Cap, Chip	0.01μF	Z 50V
C420	70041682	Cap, Chip	120pF	J 50V
C422	70041681	Cap, Chip	0.047μF	M 50V
C424	70041596	Cap, Chip	10nF	K 50V
C427	24538334	Cap, Plastic	0.33μF	J 50V
C428	24538334	Cap, Plastic	0.33μF	J 50V
C429	70041398	Cap, Chip	750pF	J 50V
C455	70041490	Cap, Chip	2.7nF	M 50V
C465	70041038	Cap, Electrolytic	10μF	M 16V
C466	24774101	Cap, Chip	100pF	J 50V
C471	70041596	Cap, Chip	10nF	K 50V
C472	24774150	Cap, Chip	15pF	J 50V
C474	24092178	Cap, Chip	0.1μF	K 25V
C476	24092178	Cap, Chip	0.1μF	K 25V
C477	70041311	Cap, Electrolytic	2.2μF	M 50V
C478	70041865	Cap, Chip	33nF	Z
C479	24814103	Cap, Chip	0.01μF	Z 50V
C480	70041727	Cap, Chip	150pF	J 50V
C481	24814103	Cap, Chip	0.01μF	Z 50V
C483	24539104	Cap, Plastic	0.1μF	J 50V
C484	70041681	Cap, Chip	0.047μF	M 50V
C485	24092178	Cap, Chip	0.1μF	K 25V
C486	70041318	Cap, Electrolytic	100μF	M 6.3V
C487	24287103	Cap, Chip	0.01μF	Z 50V
C488	24539104	Cap, Plastic	0.1μF	J 50V
C489	70041681	Cap, Chip	0.047μF	M 50V
C490	24814103	Cap, Chip	0.01μF	Z 50V
C491	24783680	Cap, Chip	68pF	J 50V
C498	70041269	Cap, Chip	220pF	J 50V
C499	24814103	Cap, Chip	0.01μF	Z 50V
C501	70040267	Cap, Ceramic, Chip	4.7nF	K 50V
C505	24815182	Cap, Chip	1800pF	K 50V
C508	70041323	Cap, Chip	8pF	C 50V
C509	24774100	Cap, Chip	10pF	D 50V
C510	24774100	Cap, Chip	10pF	D 50V
C511	24815222	Cap, Chip	2200pF	K 50V
C512	70041314	Cap, Electrolytic	47μF	M 6.3V
C513	70041314	Cap, Electrolytic	47μF	M 6.3V
C515	24783151	Cap, Chip	150pF	J 50V
C516	70041328	Cap, Chip	100nF	Z 25V
C517	70041328	Cap, Chip	100nF	Z 25V
C518	70041298	Cap, Electrolytic	1μF	M 50V
C519	24783101	Cap, Chip	100pF	J 50V
C520	70041298	Cap, Electrolytic	1μF	M 50V
C521	24783101	Cap, Chip	100pF	J 50V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
C522	70041314	Cap, Electrolytic	47μF	M 6.3V
C523	24815102	Cap, Chip	1000pF	K 50V
C524	24815102	Cap, Chip	1000pF	K 50V
C525	24814103	Cap, Chip	0.01μF	Z 50V
C526	70041515	Cap, Electrolytic	33μF	M 25V
C528	70041328	Cap, Chip	100nF	Z 25V
C529	70041596	Cap, Chip	10nF	K 50V
C530	70041596	Cap, Chip	10nF	K 50V
C531	70041328	Cap, Chip	100nF	Z 25V
C532	24092178	Cap, Chip	0.1μF	K 25V
C533	24092178	Cap, Chip	0.1μF	K 25V
C534	70041506	Cap, Electrolytic	10μF	M 25V
C535	70041596	Cap, Chip	10nF	K 50V
C536	70041596	Cap, Chip	10nF	K 50V
C537	70041596	Cap, Chip	10nF	K 50V
C538	70041596	Cap, Chip	10nF	K 50V
C539	70041589	Cap, Chip	8pF	D 50V
C540	24774070	Cap, Chip	7pF	D 50V
C542	24814103	Cap, Chip	0.01μF	Z 50V
C543	24092178	Cap, Chip	0.1μF	K 25V
C544	24814103	Cap, Chip	0.01μF	Z 50V
C546	70041314	Cap, Electrolytic	47μF	M 6.3V
C547	24814103	Cap, Chip	0.01μF	Z 50V
C548	70041518	Cap, Electrolytic	22μF	M 35V
C549	70041314	Cap, Electrolytic	47μF	M 6.3V
C552	24093962	Cap, Variable	20pF	
C560	70041314	Cap, Electrolytic	47μF	M 6.3V
C561	70041314	Cap, Electrolytic	47μF	M 6.3V
C575	24815472	Cap, Chip	4700pF	K 50V
C576	70040991	Cap, Chip	4.7nF	M 50V
C580	24783270	Cap, Chip	27pF	J 50V
C581	70041684	Cap, Ceramic	82pF	J 50V
C598	70041688	Cap, Electrolytic	220μF	Z 50V
C701	70041706	Cap, Chip	470pF	J 50V
C702	24815182	Cap, Chip	1800pF	K 50V
C703	70041300	Cap, Electrolytic	0.47F	M 50V
C704	24783101	Cap, Chip	100pF	J 50V
C705	70041596	Cap, Chip	10nF	K 50V
C706	70041038	Cap, Electrolytic	10μF	M 16V
C707	70041004	Cap, Chip	680pF	J 50V
C708	70041301	Cap, Electrolytic	22μF	M 16V
C709	70041328	Cap, Chip	100nF	Z 25V
C714	70041594	Cap, Chip	8.2nF	K 50V
C715	70041655	Cap, Chip	15nF	K 50V
C716	70041593	Cap, Chip	6.8nF	K 50V
C717	70041519	Cap, Electrolytic	4.7μF	M 35V
C726	24783101	Cap, Chip	100pF	J 50V
C727	24783101	Cap, Chip	100pF	J 50V
C728	70041401	Cap, Chip	200pF	J 50V
C740	70041328	Cap, Chip	100nF	Z 25V
C771	70041113	Cap, Electrolytic	47μF	M 16V
C772	70041596	Cap, Chip	10nF	K 50V
C773	24815472	Cap, Chip	4700pF	K 50V
C774	70041596	Cap, Chip	10nF	K 50V
C775	24082049	Cap, Plastic	0.047μF	J 100V
C777	24214221	Cap, Ceramic	220pF	K 500V
⚠C801	70041687	Cap, Plastic	100nF	M 250V
⚠C802	70041584	Cap, Ceramic	220pF	K 400V
⚠C803	70041584	Cap, Ceramic	220pF	K 400V
⚠C804	70041524	Cap, Ceramic	3.3nF	M 400V
⚠C805	70041576	Cap, Electrolytic	470μF	M 450V
C806	70041499	Cap, Plastic	33nF	J 630V
C807	24538184	Cap, Plastic	0.18μF	J 50V
C808	70041184	Cap, Chip	12nF	K 50V
C809	70041370	Cap, Ceramic	100pF	K 1kV
⚠C811	70041320	Cap, Ceramic	2.2F	M 125V
C812	70040729	Cap, Chip	1nF	J 50V
C813	70041370	Cap, Ceramic	100pF	K 1kV
⚠C821	70041510	Cap, Electrolytic	820μF	M 16V
C822	70041511	Cap, Electrolytic	220μF	M 16V
⚠C823	70041508	Cap, Electrolytic	1000μF	M 10V
C824	70041509	Cap, Electrolytic	100μF	M 10V
⚠C825	70041507	Cap, Electrolytic	220μF	M 10V
C826	70041730	Cap, Electrolytic	22μF	M 16V
C827	70041730	Cap, Electrolytic	22μF	M 16V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
C828	70041730	Cap, Electrolytic	22μF	M 16V
C829	70041509	Cap, Electrolytic	100μF	M 10V
C830	70041517	Cap, Electrolytic	22μF	M 50V
C831	70041517	Cap, Electrolytic	22μF	M 50V
C832	24539224	Cap, Plastic	0.22μF	J 50V
⚠C835	70041575	Cap, Electrolytic	470μF	M 35V
C836	70041574	Cap, Electrolytic	100μF	M 35V
C837	24538334	Cap, Plastic	0.33μF	J 50V
C838	70041731	Cap, Electrolytic	47μF	M 16V
C842	70041580	Cap, Electrolytic	10μF	M 50V
C891	70041729	Cap, Electrolytic	10μF	M 16V
C920	70041504	Cap, Electrolytic	470nF	M 50V
C921	70041504	Cap, Electrolytic	470nF	M 50V
C922	70041504	Cap, Electrolytic	470nF	M 50V
C923	70041504	Cap, Electrolytic	470nF	M 50V
C924	70041504	Cap, Electrolytic	470nF	M 50V
C925	70041504	Cap, Electrolytic	470nF	M 50V
C926	70041504	Cap, Electrolytic	470nF	M 50V
C927	70041504	Cap, Electrolytic	470nF	M 50V
C928	70041038	Cap, Electrolytic	10μF	M 16V
C929	70041038	Cap, Electrolytic	10μF	M 16V
C930	24591103	Cap, Plastic	0.01μF	J 50V
C931	24591103	Cap, Plastic	0.01μF	J 50V
C932	70041038	Cap, Electrolytic	10μF	M 16V
C933	70041038	Cap, Electrolytic	10μF	M 16V
C934	70041038	Cap, Electrolytic	10μF	M 16V
C935	70041038	Cap, Electrolytic	10μF	M 16V
C936	24591103	Cap, Plastic	0.01μF	J 50V
C937	24591103	Cap, Plastic	0.01μF	J 50V
C938	70041301	Cap, Electrolytic	22μF	M 16V
C939	70041301	Cap, Electrolytic	22μF	M 16V
C940	70041298	Cap, Electrolytic	1μF	M 50V
C941	70041298	Cap, Electrolytic	1μF	M 50V
C946	24815562	Cap, Chip	5600pF	K 50V
C947	24815562	Cap, Chip	5600pF	K 50V
C960	24794331	Cap, Electrolytic	330μF	M 16V
C963	70041301	Cap, Electrolytic	22μF	M 16V
C964	70041577	Cap, Electrolytic	330μF	M 16V
C968	70041578	Cap, Electrolytic	220nF	M 50V
C969	70041932	Cap, Chip	150nF	K
C970	24206010	Cap, Electrolytic	1μF	M 50V
C971	70041572	Cap, Electrolytic	330μF	M 10V
C972	70041596	Cap, Chip	10nF	K 50V
C973	70041038	Cap, Electrolytic	10μF	M 16V
C975	24783680	Cap, Chip	68pF	J 50V
CI01	24814103	Cap, Chip	0.01μF	Z 50V
CI02	24814103	Cap, Chip	0.01μF	Z 50V
CI03	24815102	Cap, Chip	1000pF	K 50V
		- RESISTORS -		
R092	24871202	Res, Chip	2kΩ	J 1/8W
R093	24871202	Res, Chip	2kΩ	J 1/8W
R104	24872124	Res, Chip	120kΩ	J 1/16W
R105	24871680	Res, Chip	68kΩ	J 1/8W
R106	70041609	Res, Chip	9.1kΩ	F 1/8W
R110	24871101	Res, Chip	100Ω	J 1/8W
⚠R111	70041541	Res, Fusible	8.2Ω	J 1/2W
R112	24872821	Res, Chip	820Ω	J 1/16W
R113	24872822	Res, Chip	8.2kΩ	J 1/16W
R114	70041096	Chip Jumper		
R201	24871331	Res, Chip	330Ω	J 1/8W
R202	24872512	Res, Chip	5.1kΩ	J 1/16W
R203	24872102	Res, Chip	1kΩ	J 1/16W
R204	70041613	Res, Chip	2MΩ	J 1/10W
R205	24872122	Res, Chip	1.2kΩ	J 1/16W
R206	24872272	Res, Chip	2.7kΩ	J 1/16W
R207	24872152	Res, Chip	1.5kΩ	J 1/16W
R208	24872271	Res, Chip	270Ω	J 1/16W
R209	24872222	Res, Chip	2.2kΩ	J 1/16W
R210	24872152	Res, Chip	1.5kΩ	J 1/16W
R211	24872681	Res, Chip	680Ω	J 1/16W
R213	24872822	Res, Chip	8.2kΩ	J 1/16W
R214	24872105	Res, Chip	1MΩ	J 1/16W
R215	24872105	Res, Chip	1MΩ	J 1/16W
R216	24872101	Res, Chip	100Ω	J 1/16W
R217	24872681	Res, Chip	680Ω	J 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R218	24872332	Res, Chip	3.3kΩ	J 1/16W
R221	24872102	Res, Chip	1kΩ	J 1/16W
R222	24872681	Res, Chip	680Ω	J 1/16W
R226	24872182	Res, Chip	1.8kΩ	J 1/16W
R227	70041093	Chip Jumper		
R240	24872682	Res, Chip	6.8kΩ	J 1/16W
R261	24872124	Res, Chip	120kΩ	J 1/16W
R262	24871223	Res, Chip	22kΩ	J 1/8W
R263	70041096	Chip Jumper		
R265	24872681	Res, Chip	680Ω	J 1/16W
R266	24872152	Res, Chip	1.5kΩ	J 1/16W
R267	24872681	Res, Chip	680Ω	J 1/16W
R268	24872182	Res, Chip	1.8kΩ	J 1/16W
R269	24872821	Res, Chip	820Ω	J 1/16W
R270	24872331	Res, Chip	330Ω	J 1/16W
R291	24872152	Res, Chip	1.5kΩ	J 1/16W
R292	24872333	Res, Chip	33kΩ	J 1/16W
R401	70041903	Res, Chip	43kΩ	J 1/10W
R402	24872102	Res, Chip	1kΩ	J 1/16W
R403	24872222	Res, Chip	2.2kΩ	J 1/16W
R405	24872104	Res, Chip	100kΩ	J 1/16W
R406	24871183	Res, Chip	18kΩ	J 1/8W
R415	24871102	Res, Chip	1kΩ	J 1/8W
R416	24872105	Res, Chip	1MΩ	J 1/16W
R420	70041169	Res, Chip	68Ω	J 1/10W
R423	24872103	Res, Chip	10kΩ	J 1/16W
R425	24872473	Res, Chip	47kΩ	J 1/16W
R426	24872473	Res, Chip	47kΩ	J 1/16W
R429	70041093	Chip Jumper		
R442	24872104	Res, Chip	100kΩ	J 1/16W
R465	70041210	Res, Chip	2.2MΩ	J 1/10W
R471	70041096	Chip Jumper		
R472	24872102	Res, Chip	1kΩ	J 1/16W
R475	24872393	Res, Chip	39kΩ	J 1/16W
R476	24872183	Res, Chip	18kΩ	J 1/16W
R477	24872271	Res, Chip	270Ω	J 1/16W
R478	24872102	Res, Chip	1kΩ	J 1/16W
R479	70041169	Res, Chip	68Ω	J 1/10W
R481	24872472	Res, Chip	4.7kΩ	J 1/16W
R482	24871103	Res, Chip	10kΩ	J 1/8W
R498	24872203	Res, Chip	20kΩ	J 1/16W
R499	24872183	Res, Chip	18kΩ	J 1/16W
R501	24872472	Res, Chip	4.7kΩ	J 1/16W
R502	24872821	Res, Chip	820Ω	J 1/16W
R503	24872471	Res, Chip	470Ω	J 1/16W
R504	24872224	Res, Chip	220kΩ	J 1/16W
R505	24872684	Res, Chip	680kΩ	J 1/16W
R506	70041554	Res, Chip	4.7MΩ	K 1/16W
R507	70041554	Res, Chip	4.7MΩ	K 1/16W
R508	24872182	Res, Chip	1.8kΩ	J 1/16W
R509	24872563	Res, Chip	56kΩ	J 1/16W
R510	24872182	Res, Chip	1.8kΩ	J 1/16W
R511	24872563	Res, Chip	56kΩ	J 1/16W
R512	24871102	Res, Chip	1kΩ	J 1/8W
R513	24871102	Res, Chip	1kΩ	J 1/8W
R514	24872473	Res, Chip	47kΩ	J 1/16W
R515	24872473	Res, Chip	47kΩ	J 1/16W
R516	24872912	Res, Chip	9.1kΩ	J 1/16W
R517	24872103	Res, Chip	10kΩ	J 1/16W
R518	24872163	Res, Chip	16kΩ	J 1/16W
R519	24872114	Res, Chip	110kΩ	J 1/16W
R520	24872114	Res, Chip	110kΩ	J 1/16W
R521	70041598	Res, Carbon	1Ω	J 1/6W
R522	24871201	Res, Chip	200Ω	J 1/8W
R525	24871103	Res, Chip	10kΩ	J 1/8W
R526	24871103	Res, Chip	10kΩ	J 1/8W
R527	24872472	Res, Chip	4.7kΩ	J 1/16W
R528	24872472	Res, Chip	4.7kΩ	J 1/16W
R529	24872472	Res, Chip	4.7kΩ	J 1/16W
R530	24872222	Res, Chip	2.2kΩ	J 1/16W
R531	24872392	Res, Chip	3.9kΩ	J 1/16W
R532	24872222	Res, Chip	2.2kΩ	J 1/16W
R533	24872103	Res, Chip	10kΩ	J 1/16W
R534	24872303	Res, Chip	30kΩ	J 1/16W
R535	24872473	Res, Chip	47kΩ	J 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R536	24871102	Res, Chip	1kΩ	J 1/8W
R537	24872472	Res, Chip	4.7kΩ	J 1/16W
R538	24872472	Res, Chip	4.7kΩ	J 1/16W
R543	24872182	Res, Chip	1.8kΩ	J 1/16W
R544	24872182	Res, Chip	1.8kΩ	J 1/16W
R545	24872182	Res, Chip	1.8kΩ	J 1/16W
R548	24872472	Res, Chip	4.7kΩ	J 1/16W
R549	24872472	Res, Chip	4.7kΩ	J 1/16W
R560	70040321	Res, Carbon	4.7kΩ	J 1/8W
R561	24871102	Res, Chip	1kΩ	J 1/8W
R562	24871102	Res, Chip	1kΩ	J 1/8W
R563	24872472	Res, Chip	4.7kΩ	J 1/16W
R566	24366272	Res, Carbon	2.7kΩ	J 1/6W
R567	24366272	Res, Carbon	2.7kΩ	J 1/6W
R568	24366202	Res, Carbon	2kΩ	J 1/6W
R569	24366202	Res, Carbon	2kΩ	J 1/6W
R570	24872103	Res, Chip	10kΩ	J 1/16W
R571	24872103	Res, Chip	10kΩ	J 1/16W
R572	24871472	Res, Chip	4.7kΩ	J 1/8W
R574	70041096	Chip Jumper		
⚠R591	70041605	Res, Fusible	18Ω	J 1/4W
R592	24872472	Res, Chip	4.7kΩ	J 1/16W
R593	24366102	Res, Carbon	1kΩ	J 1/6W
R598	70041136	Res, Chip	300Ω	J 1/8W
R599	24871103	Res, Chip	10kΩ	J 1/8W
R601	24872681	Res, Chip	680Ω	J 1/16W
R615	24871222	Res, Chip	2.2kΩ	J 1/8W
R621	24871104	Res, Chip	100kΩ	J 1/8W
R622	24871104	Res, Chip	100kΩ	J 1/8W
R701	24872473	Res, Chip	47kΩ	J 1/16W
R702	24872182	Res, Chip	1.8kΩ	J 1/16W
R703	24872334	Res, Chip	330kΩ	J 1/16W
R704	24872181	Res, Chip	180Ω	J 1/16W
R705	24872113	Res, Chip	11kΩ	J 1/16W
R706	24872562	Res, Chip	5.6kΩ	J 1/16W
R707	24872105	Res, Chip	1MΩ	J 1/16W
R716	24872181	Res, Chip	180Ω	J 1/16W
R718	24872562	Res, Chip	5.6kΩ	J 1/16W
R719	24871273	Res, Chip	27kΩ	J 1/8W
R733	24872104	Res, Chip	100kΩ	J 1/16W
R734	24872104	Res, Chip	100kΩ	J 1/16W
R735	24872513	Res, Chip	51kΩ	J 1/16W
R740	24872393	Res, Chip	39kΩ	J 1/16W
R741	24872273	Res, Chip	27kΩ	J 1/16W
R771	70041552	Res, Chip	3.3Ω	J 1/16W
R772	24872682	Res, Chip	6.8kΩ	J 1/16W
R773	24872101	Res, Chip	100Ω	J 1/16W
R774	24871229	Res, Chip	2.2Ω	J 1/8W
R775	24872152	Res, Chip	1.5kΩ	J 1/16W
R777	24871152	Res, Chip	1.5kΩ	J 1/8W
R791	24871473	Res, Chip	47kΩ	J 1/8W
R793	24872153	Res, Chip	15kΩ	J 1/16W
R804	24871151	Res, Chip	150Ω	J 1/8W
R805	70041606	Res, Oxide Metal	39kΩ	J 2W
R806	70041607	Res, Oxide Metal	560Ω	J 2W
R807	70041715	Res, Oxide Metal	47Ω	J 3W
R808	70041136	Res, Chip	300Ω	J 1/8W
⚠R810	70042063	Res, Oxide Metal	0.47Ω	J 1/2W
R813	70041612	Res, Carbon	620kΩ	J 1/2W
R814	24871101	Res, Chip	100Ω	J 1/8W
R820	24871202	Res, Chip	2kΩ	J 1/8W
R821	24871102	Res, Chip	1kΩ	J 1/8W
R891	24366103	Res, Carbon	10kΩ	J 1/6W
R920	24872183	Res, Chip	18kΩ	J 1/16W
R921	24872183	Res, Chip	18kΩ	J 1/16W
R922	24872273	Res, Chip	27kΩ	J 1/16W
R923	24872273	Res, Chip	27kΩ	J 1/16W
R924	24872333	Res, Chip	33kΩ	J 1/16W
R925	24872333	Res, Chip	33kΩ	J 1/16W
R926	24872273	Res, Chip	27kΩ	J 1/16W
R927	24872273	Res, Chip	27kΩ	J 1/16W
R928	24872333	Res, Chip	33kΩ	J 1/16W
R929	24872333	Res, Chip	33kΩ	J 1/16W
R930	24872273	Res, Chip	27kΩ	J 1/16W
R931	24872273	Res, Chip	27kΩ	J 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R932	24872333	Res, Chip	33kΩ	J 1/16W
R933	24872333	Res, Chip	33kΩ	J 1/16W
R934	24871273	Res, Chip	27kΩ	J 1/8W
R935	24872273	Res, Chip	27kΩ	J 1/16W
R936	70041096	Chip Jumper		
R938	70041096	Chip Jumper		
R942	24872471	Res, Chip	470Ω	J 1/16W
R943	24872471	Res, Chip	470Ω	J 1/16W
R946	24872391	Res, Chip	390Ω	J 1/16W
R947	24872391	Res, Chip	390Ω	J 1/16W
R963	24872121	Res, Chip	120Ω	J 1/16W
R964	24872121	Res, Chip	120Ω	J 1/16W
R970	24872273	Res, Chip	27kΩ	J 1/16W
R973	70041096	Chip Jumper		
R974	24871471	Res, Chip	470Ω	J 1/8W
R975	24872271	Res, Chip	270Ω	J 1/16W
R976	24872151	Res, Chip	150Ω	J 1/16W
RI01	24871303	Res, Chip	30kΩ	J 1/8W
RI02	24871223	Res, Chip	22kΩ	J 1/8W
RI03	24872182	Res, Chip	1.8kΩ	J 1/16W
RI05	24872332	Res, Chip	3.3kΩ	J 1/16W
RI06	24871151	Res, Chip	150Ω	J 1/8W
RI07	24871123	Res, Chip	12kΩ	J 1/8W
RI08	24872123	Res, Chip	12kΩ	J 1/16W
RI09	24871202	Res, Chip	2kΩ	J 1/8W
RI10	24871202	Res, Chip	2kΩ	J 1/8W
RI11	24871202	Res, Chip	2kΩ	J 1/8W
RI12	24872102	Res, Chip	1kΩ	J 1/16W
RI13	24872102	Res, Chip	1kΩ	J 1/16W
RI14	24872332	Res, Chip	3.3kΩ	J 1/16W
RI15	24871103	Res, Chip	10kΩ	J 1/8W
RJ05	70041093	Chip Jumper		
RJ06	70041093	Chip Jumper		
RJ11	70041096	Chip Jumper		
RJ12	70041096	Chip Jumper		
RJ13	70041096	Chip Jumper		
RJ15	70041096	Chip Jumper		
RJ16	70041093	Chip Jumper		
RJ17	70041093	Chip Jumper		
RJ21	70041093	Chip Jumper		
RJ23	70041093	Chip Jumper		
RJ24	70041093	Chip Jumper		
RJ27	70041093	Chip Jumper		
RJ28	70041093	Chip Jumper		
RJ30	70041093	Chip Jumper		
RJ31	70041093	Chip Jumper		
RJ32	70041093	Chip Jumper		
RJ33	70041093	Chip Jumper		
RJ34	70041093	Chip Jumper		
RJ35	70041093	Chip Jumper		
RJ39	70041096	Chip Jumper		
RJ43	70041093	Chip Jumper		
RJ44	70041093	Chip Jumper		
RJ45	70041093	Chip Jumper		
RJ47	70041096	Chip Jumper		
RJ49	70041096	Chip Jumper		
RJ52	70041093	Chip Jumper		
RJ54	70041093	Chip Jumper		
RJ80	70041093	Chip Jumper		
RJ81	70041093	Chip Jumper		
RJ90	70041093	Chip Jumper		
		- MISCELLANEOUS -		
0052M	70070025	Screw	2.6x6mm	
⚠F801	70011866	Fuse	1.6A, 250V	
F801A	23165102	Fuse Holder		
P102	23164506	Plug 2P		
P502	70011830	Connector		
P802A	70060762	Eyelet		
⚠RF826	70041604	Res, Fusible	1.5Ω	J 1/4W
⚠RF827	70041603	Res, Fusible	2.7Ω	J 1/2W
⚠RF828	70041602	Res, Fusible	2.2Ω	J 1/2W
SI02	70011826	Switch, Push		
⚠T801	70011769	Coil, Line Filter	TRF3192	
⚠T802	70011847	Poewr Transformer		
X321	70011778	Crystal	3.579545MHz	

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
X401	70011860	Crystal	4.43MHz	
X471	70012030	Crystal	4.286MHz	
X501	70011861	Crystal	16MHz	
X502	70010116	Crystal, 32kHz		
X503	70012287	Crystal	17.734MHz	
Z502	70031317	Stator		
⚠Z512	70011867	Fuse	1.6A, 125V	
⚠Z513	70011867	Fuse	1.6A, 125V	
⚠Z801	70011781	IC Protector	ICP-N10	
⚠Z811	70011864	Fuse	3.15A, 125V	
⚠Z812	70011865	Fuse	4.0A, 125V	
⚠Z821	70011781	IC Protector	ICP-N10	
Z822	70011768	DC-DC Converter		
ZI01	70011793	Photo Interrupter	GP1S562	
ZI02	70011793	Photo Interrupter	GP1S562	
ZI10	70011828	Hall Sensor	HW300B	
■0025M	70090600	P C Board Assy	Video2	
		- INTEGRATED CIRCUITS -		
IC231	70011890	IC	TA8844P	
IC431	70011891	IC	TL8843P	
		- TRANSISTORS -		
Q235	A6335470	Transistor, Chip	2SC2712-Y	
Q435	A6335470	Transistor, Chip	2SC2712-Y	
Q436	A6004040	Transistor, Chip	RN1404	
Q437	A6335470	Transistor, Chip	2SC2712-Y	
Q440	A6335470	Transistor, Chip	2SC2712-Y	
Q441	A6335470	Transistor, Chip	2SC2712-Y	
Q442	A6004040	Transistor, Chip	RN1404	
		- COILS -		
L231	70011463	Filter	ZBF503D	
L232	70011541	Coil, Peaking		
L431	70011463	Filter	ZBF503D	
L432	23237999	Coil, Peaking	TRF4109AC	
L433	70011776	Coil, Peaking		
L434	70011776	Coil, Peaking		
L435	70012114	Coil, Peaking		
L436	70011451	Coil, Peaking		
		- CAPACITORS -		
C231	24092178	Cap, Chip	0.1μF	K 25V
C232	24092293	Cap, Chip	0.1μF	Z 25V
C233	24092178	Cap, Chip	0.1μF	K 25V
C234	70041578	Cap, Electrolytic	220nF	M 50V
C235	24092293	Cap, Chip	0.1μF	Z 25V
C236	70041314	Cap, Electrolytic	47μF	M 6.3V
C237	24092293	Cap, Chip	0.1μF	Z 25V
C238	70040237	Cap, Ceramic, Chip	10pF	D 50V
C239	24092293	Cap, Chip	0.1μF	Z 25V
C423	70041589	Cap, Chip	8pF	D 50V
C430	70041376	Cap, Chip	10nF	Z 50V
C431	70040267	Cap, Ceramic, Chip	4.7nF	K 50V
C432	70041376	Cap, Chip	10nF	Z 50V
C433	24092293	Cap, Chip	0.1μF	Z 25V
C434	70041314	Cap, Electrolytic	47μF	M 6.3V
C435	24092293	Cap, Chip	0.1μF	Z 25V
C436	70041298	Cap, Electrolytic	1μF	M 50V
C437	70041472	Cap, Chip	1nF	K 50V
C438	70040238	Cap, Ceramic, Chip	15pF	J 50V
C439	24092293	Cap, Chip	0.1μF	Z 25V
C440	24092293	Cap, Chip	0.1μF	Z 25V
C441	70041376	Cap, Chip	10nF	Z 50V
C442	70041376	Cap, Chip	10nF	Z 50V
C444	70040228	Cap, Ceramic, Chip	22pF	J 50V
C445	70041589	Cap, Chip	8pF	D 50V
C446	24781270	Cap, Chip	27pF	J 50V
C447	70041376	Cap, Chip	10nF	Z 50V
C448	70041103	Cap, Chip	33pF	J 50V
C449	24092293	Cap, Chip	0.1μF	Z 25V
		- RESISTORS -		
R231	70040371	Res, Chip	22kΩ	J 1/16W
R232	70040371	Res, Chip	22kΩ	J 1/16W
R233	70041171	Res, Chip	1.2kΩ	J 1/10W
R430	70040353	Res, Chip	820Ω	J 1/16W
R431	70040353	Res, Chip	820Ω	J 1/16W
R433	70041694	Res, Chip	7.5kΩ	J 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R434	70040373	Res, Chip	47kΩ	J 1/16W
R436	70040339	Res, Chip	330Ω	J 1/16W
R437	70040354	Res, Chip	1kΩ	J 1/16W
R438	70041171	Res, Chip	1.2kΩ	J 1/10W
R439	70040571	Res, Chip	12kΩ	J 1/16W
R440	70040571	Res, Chip	12kΩ	J 1/16W
R441	70041171	Res, Chip	1.2kΩ	J 1/10W
R443	70040570	Res, Chip	470Ω	J 1/16W
R445	70040355	Res, Chip	15kΩ	J 1/16W
R446	70040348	Res, Chip	100Ω	J 1/16W
R447	70040338	Res, Chip	680Ω	J 1/16W
R448	70040352	Res, Chip	560Ω	J 1/16W
R449	70040371	Res, Chip	22kΩ	J 1/16W
■0035M	70090601	P C Board Assy	Video3	
		- TRANSISTORS -		
Q414	A6335470	Transistor, Chip	2SC2712-Y	
Q415	A6335470	Transistor, Chip	2SC2712-Y	
		- COILS -		
L403	23238703	Coil, Peaking	TRF4820AJ	
		- CAPACITORS -		
C425	24781390	Cap, Chip	39pF	J 50V
C426	24781101	Cap, Chip	100pF	J 50V
		- RESISTORS -		
R407	70040348	Res, Chip	100Ω	J 1/16W
R408	70040684	Res, Chip	680Ω	J 1/8W
R409	70040354	Res, Chip	1kΩ	J 1/16W
R410	70040354	Res, Chip	1kΩ	J 1/16W
R424	70040335	Res, Chip	27kΩ	J 1/16W
■0030M	70090712	P C Board Assy	Terminal	
		- INTEGRATED CIRCUITS -		
IC361	70011567	IC	BA7025L	
ICF01	70011881	IC	STV6400	
ICF02	70012215	IC	TL8828P	
ICF03	70012216	IC	BA7611AN	
		- TRANSISTORS -		
Q362	A6335470	Transistor, Chip	2SC2712-Y	
Q363	A6335470	Transistor, Chip	2SC2712-Y	
Q364	A6004010	Transistor, Chip	RN1401	
Q365	A6335470	Transistor, Chip	2SC2712-Y	
Q366	A6004040	Transistor, Chip	RN1404	
QF12	A6335470	Transistor, Chip	2SC2712-Y	
QF30	A6541130	Transistor, Chip	2SA1162-Y	
QF38	A6541130	Transistor, Chip	2SA1162-Y	
QF39	A6335470	Transistor, Chip	2SC2712-Y	
QF41	A6335470	Transistor, Chip	2SC2712-Y	
QF42	A6335470	Transistor, Chip	2SC2712-Y	
QF43	A6541130	Transistor, Chip	2SA1162-Y	
QF44	A6541130	Transistor, Chip	2SA1162-Y	
QF45	A6335470	Transistor, Chip	2SC2712-Y	
QF46	A6541130	Transistor, Chip	2SA1162-Y	
QF47	A6541130	Transistor, Chip	2SA1162-Y	
		- DIODES -		
DF41	A7150650	Diode	1SS184	
		- COILS -		
L351	70011854	Coil		
LF02	70010924	Coil, Peaking		
LF41	23238562	Coil, Peaking	TRF4109AJ	
LF42	70011772	Coil, Peaking		
LF43	23237975	Coil, Peaking	TRF4101AC	
LF44	23289270	Coil, Peaking	TRF4270AF	
LF45	70011463	Filter	ZBF503D	
LF46	70010918	Coil, Peaking		
		- CAPACITORS -		
C361	70041376	Cap, Chip	10nF	Z 50V
C364	24202330	Cap, Electrolytic	33μF	M 10V
C365	24202330	Cap, Electrolytic	33μF	M 10V
C366	70041300	Cap, Electrolytic	0.47F	M 50V
C367	24201470	Cap, Electrolytic	47μF	M 6.3V
C368	70041376	Cap, Chip	10nF	Z 50V
C369	70041366	Cap, Chip	10nF	Z 50V
CF01	70011349	Cap, Electrolytic	1μF	M 50V
CF02	70011540	Cap, Electrolytic	100μF	M 10V
CF03	70041376	Cap, Chip	10nF	Z 50V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
CF04	70041395	Cap, Electrolytic	0.47μF	M 50V
CF06	24206010	Cap, Electrolytic	1μF	M 50V
CF07	24206010	Cap, Electrolytic	1μF	M 50V
CF09	24092293	Cap, Chip	0.1μF	Z 25V
CF11	24781470	Cap, Chip	47pF	J 50V
CF12	24206010	Cap, Electrolytic	1μF	M 50V
CF15	70041884	Cap, Electrolytic	47μF	M 25V
CF31	70041111	Cap, Electrolytic	470μF	M 10V
CF33	24092178	Cap, Chip	0.1μF	K 25V
CF37	70040239	Cap, Ceramic, Chip	18pF	J 50V
CF38	70041376	Cap, Chip	10nF	Z 50V
CF39	24201470	Cap, Electrolytic	47μF	M 6.3V
CF41	24774330	Cap, Chip	33pF	J 50V
CF42	70040244	Cap, Ceramic, Chip	100pF	J 50V
CF43	70041376	Cap, Chip	10nF	Z 50V
CF44	70041855	Cap, Chip	22pF	J 50V
CF45	70041376	Cap, Chip	10nF	Z 50V
CF46	24092293	Cap, Chip	0.1μF	Z 25V
CF47	24774120	Cap, Chip	12pF	J 50V
CF48	24092293	Cap, Chip	0.1μF	Z 25V
CF49	70041376	Cap, Chip	10nF	Z 50V
CF80	70040230	Cap, Ceramic, Chip	1pF	C 50V
CF81	24774120	Cap, Chip	12pF	J 50V
CF82	70041103	Cap, Chip	33pF	J 50V
CF83	70041376	Cap, Chip	10nF	Z 50V
CF84	70041376	Cap, Chip	10nF	Z 50V
CF85	24092293	Cap, Chip	0.1μF	Z 25V
CF86	24206010	Cap, Electrolytic	1μF	M 50V
CF87	24201470	Cap, Electrolytic	47μF	M 6.3V
CF88	24206479	Cap, Electrolytic	4.7μF	M 50V
CF89	70041300	Cap, Electrolytic	0.47F	M 50V
CF90	70011540	Cap, Electrolytic	100μF	M 10V
CF91	24203470	Cap, Electrolytic	47μF	M 16V
CF92	24203470	Cap, Electrolytic	47μF	M 16V
CF93	24206479	Cap, Electrolytic	4.7μF	M 50V
CF94	24203470	Cap, Electrolytic	47μF	M 16V
CF95	24206010	Cap, Electrolytic	1μF	M 50V
CF96	24092293	Cap, Chip	0.1μF	Z 25V
CF97	24783200	Cap, Chip	20pF	J 50V
		- RESISTORS -		
R361	70040357	Res, Chip	22kΩ	J 1/16W
R362	70040133	Res, Chip	1kΩ	J 1/8W
R363	70040133	Res, Chip	1kΩ	J 1/8W
R364	70041464	Res, Chip	150Ω	J 1/10W
R365	70040371	Res, Chip	22kΩ	J 1/16W
R366	70040368	Res, Chip	150kΩ	J 1/16W
R369	70040357	Res, Chip	22kΩ	J 1/16W
R370	70040331	Res, Chip	10kΩ	J 1/8W
R371	70041267	Res, Chip	910Ω	J 1/10W
R372	70041924	Res, Chip	430Ω	J 1/10W
R377	70040371	Res, Chip	22kΩ	J 1/16W
R378	70040358	Res, Chip	10kΩ	J 1/16W
R379	70040133	Res, Chip	1kΩ	J 1/8W
R381	70040571	Res, Chip	12kΩ	J 1/16W
R382	70040351	Res, Chip	390Ω	J 1/16W
R383	70041171	Res, Chip	1.2kΩ	J 1/10W
RF01	70040373	Res, Chip	47kΩ	J 1/16W
RF04	70041797	Res, Chip	75Ω	J 1/8W
RF05	70041137	Res, Chip	3.9kΩ	J 1/10W
RF07	24871750	Res, Chip	75Ω	J 1/8W
RF08	70040373	Res, Chip	47kΩ	J 1/16W
RF10	70040354	Res, Chip	1kΩ	J 1/16W
RF11	70040351	Res, Chip	390Ω	J 1/16W
RF12	70040365	Res, Chip	68kΩ	J 1/16W
RF13	70040348	Res, Chip	100Ω	J 1/16W
RF14	70040338	Res, Chip	680Ω	J 1/16W
RF24	70041797	Res, Chip	75Ω	J 1/8W
RF29	70041167	Res, Chip	1.8kΩ	J 1/8W
RF30	70040348	Res, Chip	100Ω	J 1/16W
RF31	70041167	Res, Chip	1.8kΩ	J 1/8W
RF32	70041167	Res, Chip	1.8kΩ	J 1/8W
RF33	70041167	Res, Chip	1.8kΩ	J 1/8W
RF34	70040348	Res, Chip	100Ω	J 1/16W
RF36	70040354	Res, Chip	1kΩ	J 1/16W
RF38	70040354	Res, Chip	1kΩ	J 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RF39	24872103	Res, Chip	10kΩ	J 1/16W
RF41	24872102	Res, Chip	1kΩ	J 1/16W
RF42	70041096	Chip Jumper		
RF43	70040358	Res, Chip	10kΩ	J 1/16W
RF44	24872222	Res, Chip	2.2kΩ	J 1/16W
RF45	24872391	Res, Chip	390Ω	J 1/16W
RF46	70040372	Res, Chip	33kΩ	J 1/16W
RF47	70040354	Res, Chip	1kΩ	J 1/16W
RF48	70040337	Res, Chip	270Ω	J 1/16W
RF49	70040354	Res, Chip	1kΩ	J 1/16W
RF51	70041361	Res, Variable	2kΩ	1/10W
RF70	70040391	Chip Jumper		
RF71	70040391	Chip Jumper		
RF80	70040358	Res, Chip	10kΩ	J 1/16W
RF81	70041925	Res, Chip	510Ω	J 1/10W
RF82	70040353	Res, Chip	820Ω	J 1/16W
RF83	24872331	Res, Chip	330Ω	J 1/16W
RF84	70040372	Res, Chip	33kΩ	J 1/16W
RF85	70040354	Res, Chip	1kΩ	J 1/16W
RF86	70040352	Res, Chip	560Ω	J 1/16W
RF87	70040354	Res, Chip	1kΩ	J 1/16W
RF88	70040354	Res, Chip	1kΩ	J 1/16W
RF89	70040372	Res, Chip	33kΩ	J 1/16W
RF90	70040348	Res, Chip	100Ω	J 1/16W
RF91	70040348	Res, Chip	100Ω	J 1/16W
RF92	70040355	Res, Chip	15kΩ	J 1/16W
RF93	70040339	Res, Chip	330Ω	J 1/16W
RF94	24000952	Res, Thermistor	3kΩ	
		- MISCELLANEOUS -		
PF07	70061013	Phono Jack		
PF08	70011916	Connector		
PF13	70061013	Phono Jack		
PF15	70061013	Phono Jack		
XF41	70012211	Crystal	14.318MHz	
Z361	70012136	Filter	4.5MHz	
■0110M	70090699	P C Board Assy	Sub Main	
		- INTEGRATED CIRCUITS -		
IC891	70011904	IC	PQ05SZ11	
		- TRANSISTORS -		
Q001	A6335470	Transistor, Chip	2SC2712-Y	
Q002	A6541130	Transistor, Chip	2SA1162-Y	
Q003	A6004020	Transistor, Chip	RN1402	
Q060	A6541130	Transistor, Chip	2SA1162-Y	
Q061	A6335470	Transistor, Chip	2SC2712-Y	
Q070	A6004020	Transistor, Chip	RN1402	
Q071	70011788	Transistor, Chip	RN2402	
		- COILS -		
L001	70011849	Coil, Peaking		
L002	70011849	Coil, Peaking		
L003	70011848	Coil, Peaking		
L060	23238506	Coil, Peaking	TRF4229AJ	
L080	23238714	Coil, Peaking	TRF4100AJ	
		- CAPACITORS -		
C001	24774470	Cap, Chip	47pF	J 50V
C002	70041269	Cap, Chip	220pF	J 50V
C061	70041011	Cap, Chip	10pF	J 50V
C080	24794470	Cap, Electrolytic	47μF	M 16V
C081	24814103	Cap, Chip	0.01μF	Z 50V
C082	24794470	Cap, Electrolytic	47μF	M 16V
C083	24814103	Cap, Chip	0.01μF	Z 50V
C089	24814103	Cap, Chip	0.01μF	Z 50V
C090	70041500	Cap, Electrolytic	47μF	M 50V
C091	24794470	Cap, Electrolytic	47μF	M 16V
C093	24794470	Cap, Electrolytic	47μF	M 16V
C891	70041530	Cap, Chip	330nF	Z 16V
C892	24794470	Cap, Electrolytic	47μF	M 16V
		- RESISTORS -		
R001	24872102	Res, Chip	1kΩ	J 1/16W
R002	24872151	Res, Chip	150Ω	J 1/16W
R003	24872821	Res, Chip	820Ω	J 1/16W
R004	24872152	Res, Chip	1.5kΩ	J 1/16W
R005	24872102	Res, Chip	1kΩ	J 1/16W
R006	24872472	Res, Chip	4.7kΩ	J 1/16W
R007	70041093	Chip Jumper		

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R022	70041096	Chip Jumper		
R030	70041093	Chip Jumper		
R031	70041093	Chip Jumper		
R032	70041093	Chip Jumper		
R033	70041093	Chip Jumper		
R040	70041093	Chip Jumper		
R041	70041093	Chip Jumper		
R043	70041096	Chip Jumper		
R046	70041093	Chip Jumper		
R048	70041093	Chip Jumper		
R060	70041096	Chip Jumper		
R062	24871152	Res, Chip	1.5kΩ	J 1/8W
R064	24872152	Res, Chip	1.5kΩ	J 1/16W
R065	24871101	Res, Chip	100Ω	J 1/8W
R067	24872470	Res, Chip	47Ω	J 1/16W
R068	70041096	Chip Jumper		
R070	24871101	Res, Chip	100Ω	J 1/8W
R071	24871101	Res, Chip	100Ω	J 1/8W
R072	70041093	Chip Jumper		
R073	70041093	Chip Jumper		
R078	24872104	Res, Chip	100kΩ	J 1/16W
R082	70041093	Chip Jumper		
R083	70041093	Chip Jumper		
R084	70041093	Chip Jumper		
R091	24872683	Res, Chip	68kΩ	J 1/16W
		- MISCELLANEOUS -		
0010M	70012181	Tuner	FE4204	
0020M	70012182	IF Module	IF4160	
0121M	70051351	Rivet		
H004A	70060762	Eyelet		
H005A	70060762	Eyelet		
XD01	70011858	Crystal	18.432MHz	
Z001	70011933	Filter		
Z002	70011260	Filter		
■0140M	70090575	P C Board Assy	MPX	
		- INTEGRATED CIRCUITS -		
ICD01	70011902	IC	TA78L008AP	
ICD03	70011885	IC	MSP3410	
ICD04	70011886	IC	M5218AP	
ICD05	70011886	IC	M5218AP	
		- TRANSISTORS -		
QD06	A6335470	Transistor, Chip	2SC2712-Y	
QD07	70011868	Transistor, Chip	IMX1	
QD09	70011788	Transistor, Chip	RN2402	
QD10	A6335470	Transistor, Chip	2SC2712-Y	
QD11	70011868	Transistor, Chip	IMX1	
QD12	70011934	Transistor	KTA1273	
QD13	A6004020	Transistor, Chip	RN1402	
QD90	A6335470	Transistor, Chip	2SC2712-Y	
		- DIODES -		
DD01	23118041	Diode, Chip	MA111	
		- COILS -		
LD01	23238713	Coil, Peaking	TRF4120AJ	
LD02	23238707	Coil, Peaking	TRF4390AJ	
LD04	70011456	Coil, Peaking		
LD05	70011456	Coil, Peaking		
LD06	23238707	Coil, Peaking	TRF4390AJ	
LD07	23238707	Coil, Peaking	TRF4390AJ	
		- CAPACITORS -		
CD02	24783470	Cap, Chip	47pF	J 50V
CD03	24783470	Cap, Chip	47pF	J 50V
CD04	70041530	Cap, Chip	330nF	Z 16V
CD05	70041596	Cap, Chip	10nF	K 50V
CD06	24814103	Cap, Chip	0.01μF	Z 50V
CD07	24287103	Cap, Chip	0.01μF	Z 50V
CD08	24287103	Cap, Chip	0.01μF	Z 50V
CD09	24287103	Cap, Chip	0.01μF	Z 50V
CD10	70041282	Cap, Chip	2pF	C 50V
CD11	24783010	Cap, Chip	1pF	C 50V
CD12	24774270	Cap, Chip	27pF	J 50V
CD15	24206010	Cap, Electrolytic	1μF	M 50V
CD16	70041181	Cap, Electrolytic	220μF	M 10V
CD17	24287103	Cap, Chip	0.01μF	Z 50V
CD18	24203100	Cap, Electrolytic	10μF	M 16V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
CD19	24287103	Cap, Chip	0.01μF	Z 50V
CD20	24794101	Cap, Electrolytic	100μF	M 16V
CD21	70040729	Cap, Chip	1nF	J 50V
CD22	24203100	Cap, Electrolytic	10μF	M 16V
CD23	24287103	Cap, Chip	0.01μF	Z 50V
CD24	24287103	Cap, Chip	0.01μF	Z 50V
CD25	24794101	Cap, Electrolytic	100μF	M 16V
CD26	24203220	Cap, Electrolytic	22μF	M 16V
CD27	24287103	Cap, Chip	0.01μF	Z 50V
CD28	24203100	Cap, Electrolytic	10μF	M 16V
CD29	24092178	Cap, Chip	0.1μF	K 25V
CD30	70041706	Cap, Chip	470pF	J 50V
CD31	70041706	Cap, Chip	470pF	J 50V
CD32	70040737	Cap, Electrolytic	33μF	M 16V
CD33	24092178	Cap, Chip	0.1μF	K 25V
CD34	24203100	Cap, Electrolytic	10μF	M 16V
CD35	24203100	Cap, Electrolytic	10μF	M 16V
CD36	70040994	Cap, Chip	390pF	J 50V
CD37	70040994	Cap, Chip	390pF	J 50V
CD38	24814103	Cap, Chip	0.01μF	Z 50V
CD39	24794101	Cap, Electrolytic	100μF	M 16V
CD40	24203470	Cap, Electrolytic	47μF	M 16V
CD41	24815222	Cap, Chip	2200pF	K 50V
CD42	24815222	Cap, Chip	2200pF	K 50V
CD43	70041530	Cap, Chip	330nF	Z 16V
CD44	24815392	Cap, Chip	3900pF	K 50V
CD47	24206010	Cap, Electrolytic	1μF	M 50V
CD48	24206010	Cap, Electrolytic	1μF	M 50V
CD49	24814103	Cap, Chip	0.01μF	Z 50V
CD51	24093962	Cap, Variable	20pF	
CD61	70041530	Cap, Chip	330nF	Z 16V
CD62	24794101	Cap, Electrolytic	100μF	M 16V
CD63	24814103	Cap, Chip	0.01μF	Z 50V
CD64	70041530	Cap, Chip	330nF	Z 16V
CD65	70041530	Cap, Chip	330nF	Z 16V
CD66	24203470	Cap, Electrolytic	47μF	M 16V
CD67	24815392	Cap, Chip	3900pF	K 50V
CD68	24206229	Cap, Electrolytic	2.2μF	M 50V
CD69	24206229	Cap, Electrolytic	2.2μF	M 50V
CD70	24815392	Cap, Chip	3900pF	K 50V
CD71	70041594	Cap, Chip	8.2nF	K 50V
CD72	70041594	Cap, Chip	8.2nF	K 50V
CD73	24206229	Cap, Electrolytic	2.2μF	M 50V
CD77	24814103	Cap, Chip	0.01μF	Z 50V
CD81	24815122	Cap, Chip	1200pF	K 50V
CD90	70041530	Cap, Chip	330nF	Z 16V
CD91	70041530	Cap, Chip	330nF	Z 16V
CD92	24814103	Cap, Chip	0.01μF	Z 50V
		- RESISTORS -		
RD01	70041096	Chip Jumper		
RD02	70041096	Chip Jumper		
RD03	24872562	Res, Chip	5.6kΩ	J 1/16W
RD04	24872392	Res, Chip	3.9kΩ	J 1/16W
RD05	24872392	Res, Chip	3.9kΩ	J 1/16W
RD06	24872182	Res, Chip	1.8kΩ	J 1/16W
RD07	24872332	Res, Chip	3.3kΩ	J 1/16W
RD08	24872471	Res, Chip	470Ω	J 1/16W
RD09	24872221	Res, Chip	220Ω	J 1/16W
RD10	24872391	Res, Chip	390Ω	J 1/16W
RD11	24872101	Res, Chip	100Ω	J 1/16W
RD12	70041096	Chip Jumper		
RD13	70041096	Chip Jumper		
RD14	24872472	Res, Chip	4.7kΩ	J 1/16W
RD15	70041096	Chip Jumper		
RD16	24872103	Res, Chip	10kΩ	J 1/16W
RD17	24872103	Res, Chip	10kΩ	J 1/16W
RD18	24872102	Res, Chip	1kΩ	J 1/16W
RD20	24872124	Res, Chip	120kΩ	J 1/16W
RD21	24872124	Res, Chip	120kΩ	J 1/16W
RD22	24872102	Res, Chip	1kΩ	J 1/16W
RD23	24872472	Res, Chip	4.7kΩ	J 1/16W
RD24	24872102	Res, Chip	1kΩ	J 1/16W
RD25	24872184	Res, Chip	180kΩ	J 1/16W
RD26	24872184	Res, Chip	180kΩ	J 1/16W
RD28	24872104	Res, Chip	100kΩ	J 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RD29	24872104	Res, Chip	100kΩ	J 1/16W
RD30	24872102	Res, Chip	1kΩ	J 1/16W
RD31	24872102	Res, Chip	1kΩ	J 1/16W
RD32	24872102	Res, Chip	1kΩ	J 1/16W
RD33	24872102	Res, Chip	1kΩ	J 1/16W
RD34	24872103	Res, Chip	10kΩ	J 1/16W
RD35	24872103	Res, Chip	10kΩ	J 1/16W
RD36	24872102	Res, Chip	1kΩ	J 1/16W
RD37	24872102	Res, Chip	1kΩ	J 1/16W
RD38	24871102	Res, Chip	1kΩ	J 1/8W
RD39	24871562	Res, Chip	5.6kΩ	J 1/8W
RD40	24871562	Res, Chip	5.6kΩ	J 1/8W
RD41	24872221	Res, Chip	220Ω	J 1/16W
RD42	24872221	Res, Chip	220Ω	J 1/16W
RD43	24872221	Res, Chip	220Ω	J 1/16W
RD45	70041096	Chip Jumper		
RD47	24872102	Res, Chip	1kΩ	J 1/16W
RD48	24872102	Res, Chip	1kΩ	J 1/16W
RD49	24872102	Res, Chip	1kΩ	J 1/16W
RD61	70041093	Chip Jumper		
RD63	70041096	Chip Jumper		
RD64	70041096	Chip Jumper		
RD65	70041093	Chip Jumper		
RD66	70041096	Chip Jumper		
RD67	70041093	Chip Jumper		
RD68	70041093	Chip Jumper		
RD70	24872102	Res, Chip	1kΩ	J 1/16W
RD71	24872102	Res, Chip	1kΩ	J 1/16W
RD72	70041093	Chip Jumper		
RD75	70041096	Chip Jumper		
RD76	24000576	Chip Jumper		
RD77	24872471	Res, Chip	470Ω	J 1/16W
RD78	24871102	Res, Chip	1kΩ	J 1/8W
RD79	70041093	Chip Jumper		
RD80	24872103	Res, Chip	10kΩ	J 1/16W
RD81	70041093	Chip Jumper		
RD82	70041093	Chip Jumper		
RD83	70041093	Chip Jumper		
RD84	70041096	Chip Jumper		
RD85	70041096	Chip Jumper		
RD86	70041096	Chip Jumper		
RD87	70041096	Chip Jumper		
RD90	24872272	Res, Chip	2.7kΩ	J 1/16W
RD91	24871222	Res, Chip	2.2kΩ	J 1/8W
RD92	24871473	Res, Chip	47kΩ	J 1/8W
RD93	24872104	Res, Chip	100kΩ	J 1/16W
RD94	24871562	Res, Chip	5.6kΩ	J 1/8W
RD95	70041096	Chip Jumper		
RD96	70041096	Chip Jumper		
RD99	24871151	Res, Chip	150Ω	J 1/8W
		- MISCELLANEOUS -		
⚠JPD17	70012001	IC Protector		
PD01	70012011	Connector	2.5mm	
QD03A	70011915	IC Socket		
ZD01	70011464	Filter	ZBF253D-00F	
ZD02	70011464	Filter	ZBF253D-00F	
ZD03	70011464	Filter	ZBF253D-00F	
ZD04	70011464	Filter	ZBF253D-00F	
ZD05	70011464	Filter	ZBF253D-00F	
ZD06	70011464	Filter	ZBF253D-00F	
ZD07	70011464	Filter	ZBF253D-00F	
ZD08	70011464	Filter	ZBF253D-00F	
ZD09	70011464	Filter	ZBF253D-00F	
ZD10	70012258	Filter	ZJSC-470-331	
ZD11	70011464	Filter	ZBF253D-00F	
ZD12	70011464	Filter	ZBF253D-00F	
ZD15	70011862	Filter	ZJSR5101	
ZD16	70011862	Filter	ZJSR5101	
ZD17	70011862	Filter	ZJSR5101	
ZD18	70011863	Filter	ZJK5103D	
ZD19	70011863	Filter	ZJK5103D	
ZD20	70011863	Filter	ZJK5103D	
ZD21	70011863	Filter	ZJK5103D	
ZD90	70011862	Filter	ZJSR5101	
ZD91	70011998	Filter	6.5MHz	

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
■0210M	70090702	P C Board Assy	KDB1	
		- INTEGRATED CIRCUITS -		
ICX01	70010973	IC	TMP87CC70F-6210	
		- TRANSISTORS -		
QX03	A6335470	Transistor, Chip	2SC2712-Y	
QX04	A6325549	Transistor	2SC2236-Y	
QX05	70011788	Transistor, Chip	RN2402	
QX06	70011788	Transistor, Chip	RN2402	
		- DIODES -		
DX27	70011582	Diode, LED	SE303AC-YD	
DX28	70011582	Diode, LED	SE303AC-YD	
DX32	70011876	Diode, LED		
		- CAPACITORS -		
CX01	24201220	Cap, Electrolytic	22μF	M 6.3V
CX05	70041690	Cap, Chip	30pF	J 50V
CX06	70041690	Cap, Chip	30pF	J 50V
CX07	70041376	Cap, Chip	10nF	Z 50V
CX14	70040262	Cap, Ceramic, Chip	100pF	J 50V
CX20	70041376	Cap, Chip	10nF	Z 50V
		- RESISTORS -		
RX01	70041614	Res, Chip	1.8kΩ	J 1/8W
RX12	70040373	Res, Chip	47kΩ	J 1/16W
RX13	70040373	Res, Chip	47kΩ	J 1/16W
RX14	70040373	Res, Chip	47kΩ	J 1/16W
RX15	70041352	Res, Chip	4.7kΩ	J 1/8W
RX20	70040677	Res, Chip	270Ω	J 1/8W
RX25	70040679	Res, Chip	2.2kΩ	J 1/8W
RX27	70040358	Res, Chip	10kΩ	J 1/16W
RX28	70040358	Res, Chip	10kΩ	J 1/16W
RX29	70040335	Res, Chip	27kΩ	J 1/16W
RX30	70040565	Res, Chip	2.7kΩ	J 1/8W
RX31	70040565	Res, Chip	2.7kΩ	J 1/8W
RX40	70040373	Res, Chip	47kΩ	J 1/16W
RX41	70040354	Res, Chip	1kΩ	J 1/16W
RX42	70041167	Res, Chip	1.8kΩ	J 1/8W
RX48	70041601	Res, Metal	1.8Ω	J 1/2W
RX61	70040677	Res, Chip	270Ω	J 1/8W
RX66	70040359	Res, Chip	15kΩ	J 1/16W
RX67	70040678	Res, Chip	470kΩ	J 1/8W
RX68	70040333	Res, Chip	100Ω	J 1/8W
RX69	70041352	Res, Chip	4.7kΩ	J 1/8W
RX70	70040373	Res, Chip	47kΩ	J 1/16W
RX71	70041352	Res, Chip	4.7kΩ	J 1/8W
RX72	70040132	Res, Chip	22kΩ	J 1/8W
RX73	70040341	Res, Chip	10Ω	J 1/16W
		- MISCELLANEOUS -		
GX01	70012214	FIP	7-MT-171GNK	
SX07	23344094	Push Switch		
SX10	23344094	Push Switch		
SX11	23344094	Push Switch		
XX01	70010937	Resonator	8MHz	
ZR01	70011443	F.U.	IR-9106A-D	
■0212M	70090476	P C Board Assy	FCB	
		- CAPACITORS -		
C943	70041472	Cap, Chip	1nF	K 50V
C944	70041472	Cap, Chip	1nF	K 50V
		- RESISTORS -		
R940	70040354	Res, Chip	1kΩ	J 1/16W
R941	70040354	Res, Chip	1kΩ	J 1/16W
RF80	70041441	Res, Chip	75Ω	J 1/10W
		- MISCELLANEOUS -		
P982	70011917	Connector	3.5mm	
P983	70011918	Socket		
PF81	70011919	Socket		
■0225M	70090703	P C Board Assy	KDB2	
		- DIODES -		
DX26	70011582	Diode, LED	SE303AC-YD	
DX49	70011875	Diode, LED		
		- RESISTORS -		
RX43	70040133	Res, Chip	1kΩ	J 1/8W
RX44	70040354	Res, Chip	1kΩ	J 1/16W
RX45	70041694	Res, Chip	7.5kΩ	J 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
		- MISCELLANEOUS -	
SX01	23145394	Push Switch, 1C1P	
SX05	23145394	Push Switch, 1C1P	
SX06	23145394	Push Switch, 1C1P	
SX08	23145394	Push Switch, 1C1P	
SX09	23145394	Push Switch, 1C1P	
SX21	70012222	Slide Switch	
SX22	70011993	Slide Switch	1C3P
■0270M	70090445	P C Board Assy	JSB
		- MISCELLANEOUS -	
SX18	70061011	Switch	Shuttle

LOCATION NUMBER	PART NUMBER	DESCRIPTION

SPECIFICATIONS

Format	:	VHS standard
Recording system	:	Rotary, 2-head helical scan system
Video heads	:	6 heads
Video signal system	:	CCIR; 625 lines, 50 fields, PAL/SECAM colour signal NTSC COLOUR, EIA standard, 525 lines
Tape speed	:	SP : 23.39 mm/s (PAL/SECAM/MESECAM) SP : 33.35 mm/s (NTSC) LP : 11.70 mm/s (PAL/SECAM/MESECAM) SLP : 11.12 mm/s (NTSC)
Recording time	:	SP : 240 minutes with E240 cassettes (PAL/SECAM/MESECAM) LP : 480 minutes with E240 cassettes (PAL/SECAM/MESECAM) SP : 160 minutes with T-160 cassettes (NTSC) SLP : 480 minutes with T-160 cassettes (NTSC)
Winding time	:	Approx. 110 seconds with E180 cassettes
Dimensions	:	430 (W) × 92 (H) × 317 (D) mm
Mass	:	4.7kg
Operating temperature	:	+5 to +40°C
Operating humidity	:	Less than 80% RH
Mains power	:	110 – 240 V AC, 50/60 Hz
Power consumption	:	27 W (in operation)
CONNECTORS		
Aerial input	:	75 Ω coaxial
Aerial output	:	75 Ω coaxial
Video input	:	LINE IN VIDEO Phono type jack, 1.0 V(p-p), 75 Ω SAT. IN VIDEO Phono type jack, 1.0 V(p-p), 75 Ω LINE IN 2 VIDEO Phono type jack, 1.0 V(p-p), 75 Ω
Audio input	:	LINE IN AUDIO Phono type jacks, 308 mV(rms), more than 47 kΩ SAT. IN AUDIO Phono type jacks, 308 mV(rms), more than 47 kΩ LINE IN 2 AUDIO Phono type jacks, 308 mV(rms) more than 47 kΩ
Video output	:	VIDEO OUT Phono type jack, 1.0 V(p-p), 75 Ω
Audio output	:	AUDIO OUT Phono type jacks, 308 mV(rms), less than 4.7 kΩ
VIDEO		
Signal-to-noise ratio	:	More than 43 dB (SP mode/PAL)
AUDIO		
Signal-to-noise ratio	:	More than 42 dB (SP mode/PAL/normal mono)
Frequency range	:	20 Hz to 20 kHz (Hi-Fi mode)
Dynamic range	:	More than 90 dB (Hi-Fi mode)
Audio track	:	1 track (Normal-mono), 2 channels (Hi-Fi sound)
TIMER		
Clock	:	24-hour digital indication
No. of events	:	6 events 1 month
Backup time	:	Approx. 30 minutes
TUNER		
System	:	Frequency synthesizer
Channel coverage	:	PAL, SECAM B/G VHF: E2 – E12, UHF: E21 – E69, CATV: X – Z, S1 – S41 PAL I UHF: E21 – E69 SECAM D/K VHF: R1 – R12, UHF: E21 – E69 PAL D VHF: C1 – C12, UHF: C13 – C57 NTSC-M VHF: 2 – 13, UHF: 14 – 69, CATV STD (HRC/IRC): 1 – 125 (U.S.) VHF: 1 – 12, UHF: 13 – 62, CATV: C13 – C63 (Japan)
RF converter	:	UHF channel 60 (53 – 89, adjustable)
Accessories	:	Aerial cable ..... 2 Remote control unit ..... 1 Batteries (R03) ..... 2 Plug adapter ..... 1 PAL-F converter plug 2

Designs and specifications are subject to change without notice.